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TELEPHONE ENGINEER

MANAGEMENT · ENGINEERING · MAINTENANCE

VOL. 44, No. 11 NOVEMBER 15, 1940

ACROSS THE Editor's Desk

Quizzicus seems to be receiving all of the mail these days and is having a merry old time. Since he started his feature in TELEPHONE ENGINEER the manufacturers have received several ideas that are now in the process of being tested for use in the telephone field. In this issue he has his regular feature on page 25 and continues his offer of $2.50 for each acceptable new idea. Quizzicus also tosses his change of pace ball on page 40. We hope you agree.

▼

Also in this issue Ray Blain gives you his impressions of the National Convention held last month. He informs us that the meeting was the most informative one he had ever attended. We are very proud of Ray and his camera and want to extend him our thanks as well as that of the entire industry for his good work.

▼

A post card from Louis Pitcher, National Association executive, from balmy Florida reaches us on a day that a windstorm broke all records for this century. Louis is busy attending the conventions in the Southeast where he delivered one of the principal addresses at each meeting. We had hoped to attend these meetings but were unavoidably detained at the last minute because of illness.

CONTENTS

- Across the Editor's Desk 13
- Browsing at the National Convention By Ray Blain 17
- Highlights of the Communications News By Roland C. Davies 20
- A Short Course in Telephone Transmission By B. C. Burden 23
- Estimating Construction Costs By Jay G. Mitchell 28
- Line and Desk—By Ray Blain 30
- Long Lines—By R. A. Clark, Jr. 32
- Quizzicus Asks Questions 35
- 25 Years Ago This Month 40
- Monthly Station Barometer 44
- Census Report on Equipment Sales 45
- Index to Advertisers 50

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SERVING THE FIVE BILLION DOLLAR TELEPHONE INDUSTRY

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Sept. 1899

Toll Switchboard at the Michigan Telephone Co. Detroit, Mich.

In the Gas Light Era

Time has done some fast marching in the past fifty years. Here is a telephone exchange as of Sept. 1899. Note the gas lights and the exposed cords. Note, too, the early Model Calculagraphs. For even in those early days, mechanical calculating of toll messages was not unknown.

Today, gone is the old fashioned set-up. The new Model 33 Calculagraph is now streamlined to handle the greatly increased volume of business. It now fits into the space occupied by only 4 type A keys and is improved to give accurate, to-the-second records of all toll messages, an integral part of every central office set-up.

Model 33

SPECIFICATIONS: MODEL 33

COMPACT—7½"x3⅜". Takes up minimum space on switchboard.

WEIGHT—8 pounds.

UNOBSTRUCTED VIEW—Full vision of dial from any position on the switchboard.

SWEEP SECOND HAND—Tells the end of the initial period at a glance.

CALCULAGRAPH COMPANY

Main Office and Plant:

308 SUSSEX STREET HARRISON, N. J.

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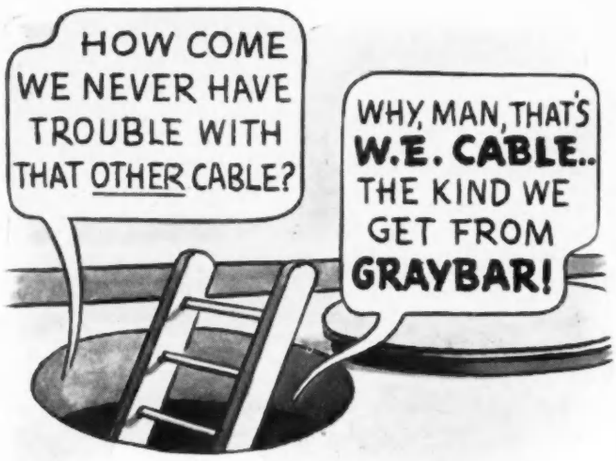
Accurate Toll Timing to the Second!



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by Western Electric

for Trustworthy Telephone Service

When you buy telephone cable, it's actually an economy to buy only the best. Western Electric lead-covered telephone cable—whether for underground or aerial use—is made to the strict Bell Telephone specifications for long-continued service as a means to lower overall costs.

What's more, when you buy your cable through GRAYBAR, you get the benefit of specialized knowledge in choosing the right cable for the job.

GRAYBAR distributes a complete line of electrical supplies attuned to the needs of independent telephone companies. From GRAYBAR, too, you get extra values of adequate local stocks, prompt service, and well-informed purchasing assistance.

GRAYBAR ELECTRIC COMPANY
Offices in 82 principal cities
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To help meet any telephone supply need — call for the Graybar specialist.

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Amertel

offers
MONEY-SAVING ADVANTAGES

1. **LONGER SPANS.** In addition to the regular grades, "EBB," "BB," and "Steel," *Amertel* is available in two high-tensile grades, Amertel-85 and -135. These two grades, in No. 12 B.W.G., in heavy loading districts, can be used in spans of 225 and 350 feet, respectively.

2. **OUTSIDE PLANT ECONOMY.** These high-tensile strength wires, since they make possible longer spans, keep investment in outside plant at a minimum. Construction costs are lower, and material requirements are reduced accordingly.

3. **LOWER MAINTENANCE.** All *Amertel* Telephone wires are evenly and heavily coated with commercially pure zinc, by our "True-Bonding" process which assures a tight, faultless bond between steel and zinc. This protection means longer life for the wire and less expense for maintenance of the line.

4. **STANDS HEAVY LOADING.** Amertel-85 and -135, the high-tensile telephone wires, even when used at the maximum permissible span lengths, have greater reserve strength, greater ability to withstand emergency loads, such as the stresses due to heavy icing and high winds.

Don't overlook these advantages. Write today for complete technical data on *Amertel*. And on your next new construction or replacement job, be sure to specify *Amertel*—in the right grade for your requirements.

LOOK FOR THIS TAG. *It is placed on every coil of Amertel Telephone and Telegraph Wire for your protection.*

AMERICAN STEEL & WIRE COMPANY
Cleveland, Chicago and New York
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

BOTH are golfers

...but ONE is a CHAMPION!

Developed and constantly improved *in the world's largest battery laboratory, "Eveready" "Columbia" "Gray Label" Long Life telephone cells combine long life, rock-bottom economy and sustained voltage.*

It's control that makes the difference!

A champion golfer keeps control under constant strain. A champion battery keeps control under constant *drain.*

Many telephone men have discovered by years of trial and comparison that "Eveready" "Columbia" "Gray Label" Long Life telephone cells have the controlled stamina that means top performance under grueling conditions.

Competition against all comers has proved that these champion cells give higher sustained voltage that helps maintain better transmission standards . . . insure subscriber satisfaction.

That's why more "Eveready" "Columbia" "Gray Label" Long Life telephone cells are used by independent telephone companies *than any other brand.* May we suggest that you specify them in your next order?

CHAMPION FOR THREE REASONS

1. LONGER LIFE. More economical . . . give you many extra hours of service life.

2. SUSTAINED VOLTAGE. Means improved transmission efficiency.

3. UNIFORM QUALITY. Every cell identical... built to a single standard of highest quality.

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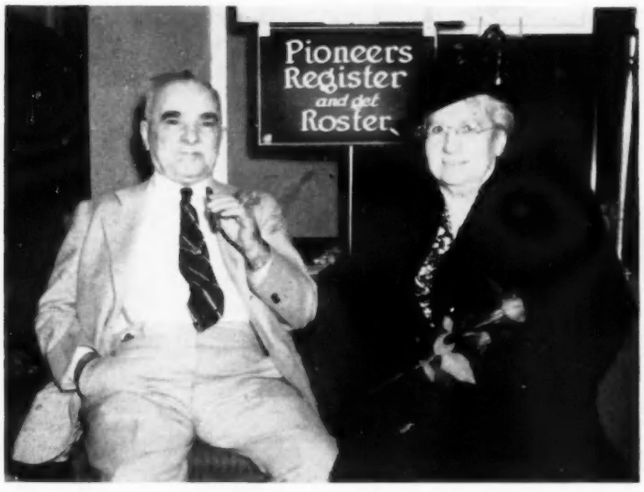


Reading from left to right are George King, Columbia, Missouri; John Brown Cook, Chicago; E. Winston Rodormer, Chicago; John W. Wopat, Fort Wayne; and G. E. Morse and P. K. Rhoads, Chicago—Right Mr. and Mrs. P. Kerr Higgins at the registration desk.

Browsing At The NATIONAL CONVENTION

WITH RAY BLAIN

(Illustrated by the author)

THE 44th Annual Convention of the United States Independent Telephone Association is now history. Despite the general unsettled condition of the world caused by dictators, war, politics and general unrest, this Convention was not only larger, but better than ever before. Telephone men who attended this Convention found it an easy task to bring themselves up-to-date and became familiar with all of the latest developments of the telephone art.

Manual switchboards of both multiple, non-multiple and cordless types were on display. Considerable improvement is noted in the design of this equipment from both a service and maintenance standpoint. Switchboards are more streamlined and better proportioned and the use of the correct posture type of metal operator's chair makes a very neat arrangement.

The latest types of automatic equipment were displayed and demonstrated by four different companies. It was a simple matter for interested parties to look over these units and obtain information as to how it could be used in a particular exchange to meet any service condition.

Main frame and protector equipment, also various types of cable terminals were on display and engineers in attendance were qualified and willing to explain how they could be used to meet any service condition. Main frames are now often welded together which makes a neat and strong job. The underground cable terminal is now available in various sizes and is proving quite popular. The inside type terminal is being reduced in size and price, both of which is commendable. Small 1 and 2 pair cable terminals are now available for use on buried wire or small distribution cables.

Subscriber's station equipment all shows improvement over the past few years. Colored telephones displayed on a revolving table under amber lights with a background of cut flowers made a most beautiful picture. The hanging handset type telephone seems to be gaining in popularity. Even a handset type magneto telephone is now available and proving popular.

The American Automatic Sales Company had a large display of their automatic switching equipment, telephones, supplies and construction material. A display of this company's telephones showing the progress made during a fifty-year period attracted considerable attention. They also had on display a handset telephone made of transparent lucite which marked the 1,600,000 telephone of this type manufactured since 1926.

Among the automatic representatives in attendance were Arthur Bessey Smith, Charles Cadwell and Harry La Plante. Bill Chapin, the Washington representative, arrived early Friday morning with the low-down on all matters from the National Capitol.

L. E. Spencer, General Sales Manager of Stromberg-Carlson and Mrs. Margaret Cureton inspect latest developments in handset equipment at the National Convention.

Snapped in the National Telephone Supply Co. exhibit room were Stewart Wright, Sales Manager, and F. P. Auxer, President.

RIGHT — Lee McCanne explains to W. T. Henning and T. N. Carnahan of the Cameron Telephone Company, Sulphur, La. Stromberg-Carlson's new Relaydial system.

LINE hardware shows improvement and various new items were on display. The Stromberg-Carlson Company had a creosoted pine pole with crossarm set up in one of their exhibit rooms to indicate how various items of material can be used.

Mr. W. A. Hammond of the W. A. Hammond Drierite Company was on hand with apparatus to prove the cable drying properties of dessicant.. There seems to be no doubt but that this drying agent will be used extensively for all cable splicing in the future.

Bill Dillon of the W. C. Dillon & Company, Inc., was on hand demonstrating his anchors, dynamometers and temperometers. Bill states that he has moved his factory and laboratory into new quarters and that business is humming. The new low cost dynamometer will undoubtedly prove most desirable in the stringing of cable messenger and the new high-tensile wire to proper tension.

Colonel Hirsch of the Gustav Hirsch Organization was on hand greeting his many friends from all parts of the country. The Colonel is hale and hearty and we will wager that he could win at least one more war should it ever be necessary.

The James R. Kearney Corporation exhibit was complete and interesting. Mr. Nelson D. Stoker was on hand to explain the various items and answer questions.

The Holtzer-Cabot exhibit of ringing generators and allied equipment was as usual interesting. Mr. E. F. Schmidt, Jr., was the official greeter and question answerer.

The Leich Sales Company was extremely interesting and instructive. Switchboards and other equipment and material was displayed to advantage. Roy Siemund and several other members of this organization including W. S. Cadwell and Dick Faulhaber were on hand to do the honors. It is understood that a record number of tape samples were handed out in the wire room although we would not infer that the charming young lady dispenser had anything to do with this volume of business.

MR. FRED HEAVENS and Mr. C. P. Stocker of the Lorain Products Company were on hand to explain the virtues of the sub-cycle ringing apparatus, that machine which generates ringing current without moving parts.

The National Carbon Company had a neat display of their various products and as usual were handing out big red apples. Messrs. E. F. Schultz, J. J. Burke and W. E. Herr were on the job greeting old friends and making new ones.

The National Telephone Supply Company explained the virtues of splicing sleeves and various types of splicing sleeves. Steward Wright was ringmaster and did a good job as usual.

The North Electric Manufacturing Company had a complete exhibit of their automatic switching equipment, telephones and other products. They had a demonstration of a laboratory type dial tester with a counter attachment and thousands of operations were being run up on dials under test. A bank of relays was also being operated at a terrific rate of speed to indicate its general reliability. Some of the North men on hand were F. R. McBerty, G. A. Berting, R. C. Arter and Stan Lorens.

H. R. VAN DEVENTER demonstrated the Peatrophone, the mechanical secretary, to the tremendous interest of everyone. This machine permits a person to leave a message for his friends who may call during his absence and then permits the friend to leave a message which can be played back upon the return of the absent party. We predict a great future for this clever machine even though no pleasure can be gained by having it set on one's lap.

THE Recordak gave a clever demonstration of how toll tickets and other records can be photographed in miniature and then viewed with a special

Chester Ruth, Chicago; Col. Gustav Hirsch of Columbus, Ohio and John Jaap, Chicago are shown in the Cook Electric Company exhibit room.

How does it work? Stromberg-Carlson's Telephone Sales Manager, Ralph Barger, explains to Lloyd C. Wright of the Jamestown (New York) Telephone Company, that vibration moves the signs in this display.

projector. This equipment avoids the retention of bulky records.

The Shallcross Manufacturing Company had an attractive display of their numerous testing instruments. Mr. F. D. Mitchell, although newly-wed, was on the job and answering questions for all in a most satisfactory manner.

The Signal Engineering and Mfg. Company had an interesting exhibit of signaling devices with Mr. E. C. Baumann in charge. Many of the devices shown could be used to good advantage in the telephone business.

The Unique Manufacturing Company with Mr. E. G. Goller in charge gave accurate information and advice on the use of blow torches, furnaces and other tools so necessary for good telephone cable splicing.

The Vandeveer and Walker Company demonstrated a pole support which is both novel and logical. This equipment replaces the well known pole stub and acts somewhat as a splint for a broken pole. Iron members are driven into the ground and then clamped to the pole. We are probably due to hear considerably more of this product in the future.

The Stromberg-Carlson Company had a complete display of all their products which included both manual and automatic equipment. One feature of the display depicted progress of the telephone from 1884 to 1940. Also shown was a large model relay operated constantly and each time the contacts made a light flashed to indicate operation. This model indicated clearly the construction of a new relay design. This company also displayed cordless switchboards of a new design. Among the Stromberg men present were Messrs. McCaig, Preble, Powell, Barger, Dr. Ray H. Manson and Charlie Hestor.

The Banks Manufacturing Company was on hand with a complete display of loud speaking telephones. It seems a safe bet that this type of communication is to be considerably increased in the not too far distant future.

The Copperweld Steel Company was on hand and all busy as usual. The usual Copperweld products were explained and particular attention was given to proper grounding methods. An inexpensive ground tester was demonstrated which may be used to detect inferior ground connections. Bill McIlvane, Ed Kennedy, Vic Curtis and W. W. Ege were on the job.

THE Buckeye Telephone & Supply Company was represented by Mr. Snyder and son who were both busy greeting old friends. They had a clever stunt of looping a puzzle pencil into your button hole. When you tried to remove the pencil you realized its puzzling nature so the majority of the boys went back to the Snyder family to obtain a solution. Darn clever, these telephone men, we say!

The Burgess Battery Company had an attractive exhibit and were willing to supply any needed dry cell information. Acousti-booths of the doorless variety were also on display.

The Churchill Cabinet Company had an attractive modernistic booth near the registration desk where all were invited to make local calls free of charge.

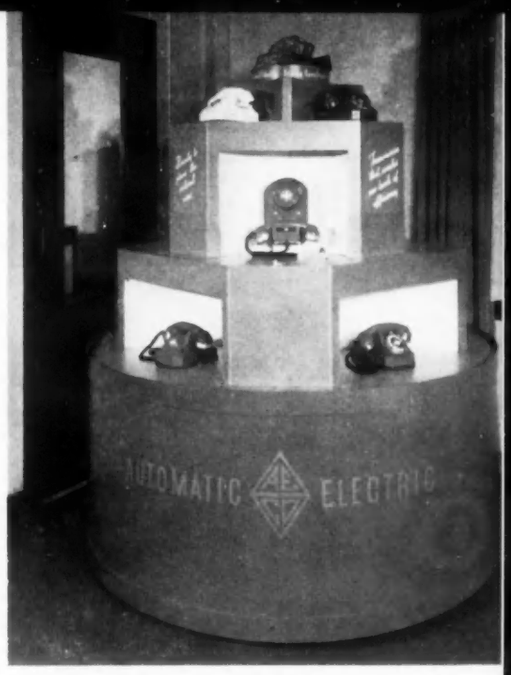
The various products of the A. B. Chance Company were explained by Mr. J. J. Milligan. Considerable attention is being paid to good buying these days and necessary material on display in this exhibit was examined with interest.

The Highway Trailer Company was represented by Mr. Gokey and W. S. Pedley and The American Coach and Body Company by Mr. James Holan and Fred Hall. These men were able to give full information on all construction and maintenance truck equipment.

The American Steel & Wire Company was ably represented by H. C. Hansen and J. J. Philbin. Considerable interest was voiced in the use of the new high tensile strength wire for long span construction.

THE Kellogg Switchboard and Supply Company had a complete exhibit of their products. The company's comprehensive line of manual and automatic switching equipment was on display. A ferris wheel arrangement displayed various products being manufactured by this company for National Defense purposes as a silk American flag fluttered above. Among the Kellogg men present were Mr. McGrath, Jim Kellogg, Ray Krueger, Marty Bellion, Bob

(Please turn to page 36)



The 1,600,000th Monophone manufactured by Automatic Electric Company topped this revolving display at the national telephone convention.

"It's only a suggestion, Neighbor, but I think you'll find you can run your business more efficiently with a phone of your own!"

Highlights of the Communications News

Important Communications developments of the past month, briefed for busy readers

by

ROLAND C. DAVIES
Editor, Telecommunications Reports

Prognostications

PRESIDENT Roosevelt with his outstanding victory of reelection for his Third Term is anticipated to make a wholehearted drive by words and actions for a strong national unity and cooperation among all classes in the United States to make national defense preparedness a complete success during the next two months before his January 20 inauguration. His first move was an appeal for the unification of the two warring labor organizations— the C.I.O. and A.F. of L.—and his next drive is slated to be a plea for the unqualified cooperation of industry in the defense production task which to a major extent is already being accorded but will mean greater efforts with the actual manufacturing of the tremendous amount of supplies needed by the military establishments.

The present Defense Advisory Commission on which Knudsen and Stettinius are serving is expected to be continued without any organizational changes except that an administrator-coordinator will be probably appointed soon to speed up its activities at even a greater rate than now exists. Donald M. Nelson, Sears-Roebuck executive, who has achieved a notable record as coordinator of purchasing and priorities, is considered the outstanding possibility as administrator of the Commission. It must be stressed the the present war and national defense preparedness means the greatest technical, mechanized, military establishment in history and the Administration has to rely on industry and its technical experts to carry on this task.

For the communications industry, there will be few, if any, changes in the present trend of Washington affairs as a result of the President's reelection. The Defense Communications Board will continue its formulation of plans for the telephone industry and other branches of communication to be put into effect in the event of a war emergency and will shortly establish the organization of the industry advisory committees, including one representing the Bell System and Independents. The D.C.B. is not expected to "spring" any startling proposals for the drastic control of telephone industry operations, even in event of war, and probably its chief recommendation will be the securing of statutory powers for the Army to take over telephone facilities in a theatre of fighting which would be a natural and necessary step. The furnishing of telephone facilities for the Army and Navy encampments and bases is proceeding in a highly satisfactory manner from the viewpoint of the Defense authorities and the manufacturing of telephone equipment is likewise progressing efficiently. It might be noted that the Army apparatus needs at present are mainly for radio equipment to be used for the Air Corps—approximately 80% of the current contracts being for this type of material.

Communications Men to Signal Corps

Telephone workers inducted into the Army under the Selective Service Act will be assigned to duty in communications under a plan promulgated recently by order of Secretary of War Stimson and Major General E. S. Adams, the Adjutant General.

The order read that "it is desired that all Selected Service men inducted into the service whose civilian occupation has been in the Engineering or Plant Departments of the American Telephone and Telegraph Co., the Associated Bell Companies, the Independent Telephone Companies * be assigned to the Signal Corps organizations. In the event that the total number of Selective Service trainees falling within the occupations named above, received in any one corps area, be in excess of the needs of Signal Corps Units in that corps area the War Department will direct the transfer of the excess to Signal Corps Units of other corps areas."**

BECAUSE national defense preparedness is to be the major objective of President Roosevelt for months to come, it is believed that the New Deal reform and regulatory program will not be advanced beyond its present status while this task confronts the government. There may be some expansion of Social Security and Wage-Hour activities, together with extension of public power resources, but the indications are that there will be little or no enlargement of Federal regulation directly affecting the telephone industry. The FCC will be busy—probably for the next winter and spring—on the launching of the new broadcasting services of frequency modulation and television and whatever increased telephone regulator activities on the slate will be directed against the American Telephone and Telegraph Co. and the Bell System.

For the Independent telephone industry, the Cleveland campaign address of the President appeared significant because Mr. Roosevelt pledged his efforts to continue private enterprise and private property but protected from monopoly of financial control. The President stressed that small businesses would have "really a chance to flourish and grow." Mr. Roosevelt seemed to be striking at financial monopoly rather than the generally recognized "natural" monopoly of a single telephone service in a community in this address.

The achievement of a labor peace between the C.I.O. and A.F. of L. will probably be motivated in its initial negotiations after the C.I.O. convention in mid-November when John L. Lewis is expected to retire from his presidency and will in all likelihood be succeeded by Philip Murray, head of the steel workers union and one of the ablest labor officials in the country. Murray in the past has leaned towards a truce with the A.F. of L. The speculation is that Sidney Hillman, another C.I.O. leader, through his post on the Defense Advisory Commission and his cooperating committee of fifteen outstanding union officials of both groups will utilize the latter committee as a springboard to launch the labor peace and unity. Even though the two great labor organizations should end their civil war and present a united front, it is believed that such a strong, virile independent union as the Federation of Telephone Workers with its 150,000

ister upon entering the buildings and be accompanied by guides to the offices where they wish to call.

●

FCC Vacancy

An excellent possibility for the appointment to the FCC vacancy is an outstanding state commissioner, Ray C. Wakefield member and former president of the California Railroad Commission. He would replace Commissioner Thad H. Brown who asked President Roosevelt Oct. 14 to withdraw his reappointment to a 7-year term. Mr. Wakefield who is also vice president of the National Association of Railroad and Utilities Commissioners, is regarded as one of the ablest persons in the state commission field with a policy of achieving regulatory objectives through processes of negotiation and fair dealing.

The appointment to the FCC vacancy is likely to be made in the latter part of November by President Roosevelt. Other leading aspirants for the FCC post are Judge John C. Kendall, a radio lawyer of Portland, Oregon, Willis J. Ballinger, now Federal Trade Commission Economic Adviser and one of the left-wing New Dealers and Nelson Lee Smith, Chairman of the New Hampshire Public Service Commission. There is a dim possibility, however, that the appointment may come as a "merit selection" by the elevation of one of the FCC leading staff officials.

Commissioner Brown retired to enter private practice of law after his reappointment had been doomed by a lengthy investigation by the Senate Interstate Commission Committee which almost turned into a probe of the FCC broadcasting regulatory policies.

●

War Department Fire

There was no loss nor destruction of any important secret records and documents of the Army Signal Corps or of the Army codes in the serious fire which destroyed the new fourth floor of the War Department Munitions Building Oct. 30. The fourth floor was under construction at the time of the blaze and the damage to the lower stories, occupied by the various branches of the War Department, was mainly from water, smoke and heat. However, the fire, which appears to have been definitely accidental, and not considered due to any sabotage, has expedited the plan of the Federal authorities to tighten regulations for the admission of visitors to the War and Navy Departments. It is anticipated that both the War and Navy Departments will issue in the near future identification cards to all employees, newspapermen and regular visitors to the buildings. This will mean that occasional visitors will have to reg-

H. C. White, Auditor, Jamestown (N. Y.) Tele. Co., addressed the accounting conference on Budget Control at the recent national convention.

ister upon entering the buildings and be accompanied by guides to the offices where they wish to call.

●

Frequency Modulation

Frequency modulation broadcasting on a commercial basis was given the "green light" signal by the FCC Oct. 31 with the authorization of 15 FM stations geographically scattered throughout the nation. These stations have a potential FM service area of 110,000 square miles reaching a population of more than 27,000,000 persons. They are located in Detroit, Los Angeles, Schenectady, New York, Brooklyn, Evansville, Ind., Mt. Washington, N. H., Binghampton, N. Y., Baton Rouge, Columbus, Ohio, Salt Lake City, Chicago and Milwaukee. FCC Chairman James Lawrence Fly declared that "the granting of these licenses by the Commission marks an important mile stone in the continued advance of the radio industry." The FCC in the near future will authorize around 50 more FM stations.

●

$850,000 Toll Rate Reduction

Revision of interstate telephone toll rates for short-haul traffic between the Greater New York City area and adjacent Northern New Jersey was effected in new tariffs with the FCC by the New Jersey Bell Telephone Co., and the New York Telephone Co., which will produce an estimated rate reduction of $850,000 a year. The new tariffs will become effective Dec. 1 and the revised rates will bring these short-haul New York-New Jersey rates down to the same level as the schedules of the A. T. & T. Long Lines for traffic for points 40 miles or less apart.

Defense Requirements

The extraordinary requirements of national defense, together with the stimulation of business activity, has led to a huge increase in new telephone toll construction to augment the national telephone network of the A. T. & T. Co. For the first four months of the present government fiscal year up to Oct. 31 the FCC has approved a total expenditure for interstate toll facilities of $12,670,105 as compared to the $9,070,952 for the entire fiscal year ending June 30, 1940.

During October the FCC authorizations included the construction of two new telephone cables at an estimated cost of $1,146,000 between Richmond and Norfolk, Va., because of the tremendous increase in Navy, Army and ship building activities in the latter area; the construction project of $1,344,100 between Redding and Weed, California to move facilities out of the Sacramento Valley and to increase the California toll network to Oregon and Washington; new toll facilities costing $672,600 between Sacramento and Stockton, California to permit direct routing from Los Angeles to this section where there are several new Army aviation bases; a $943,000 toll construction project between Wyanet and Springfield, Illinois, to eliminate a toll "bottle neck" around Springfield with additional facilities from Chicago to St. Louis into the transcontinental routes; and approval of two plowed-in cables between Baltimore and Washington instead of the previous plan of a single coaxial cable.

●

Defends TWX Tariffs

The West Coast Telephone Co. through Albert N. Johns, its Vice President, defended its plan of a $30 monthly minimum guarantee and a year's contract for teletypewriter exchange service at a three-day FCC hearing, Oct. 28-30, on the ground that TWX could not be operated profitably in that company's territory under the $10 minimum and monthly contract arrangements used by the Bell System. The West Coast Telephone Co., executive emphasized that TWX was discriminatory to the small user and injured the toll and local exchange rate structure. The West Coast Telephone Co. is the only Independent company which operates its own TWX service—in the territories of the other Independents the Bell Companies lease loops from the Independents, the latter also receiving a payment per message for billing and collecting. The West Coast Telephone Co. claimed that without the $30 minimum

(Please turn to page 37)

EDITORIAL

Nebraska Commission Points the Way

A recent action of the Nebraska State Railway Commission is a signboard pointing the way to sounder regulation of utilities by state commissions.

The Nebraska Commission, on its own initiative, issued September 24, 1940 an order designed to relieve telephone companies under its jurisdiction but not also under the jurisdiction of the Federal Communications Commission, from complying with the provision of F. C. C. Uniform System of Accounts for Telephone Companies which requires Class A and Class B telephone companies to maintain a continuing property record.

This proposition of requiring Class A and Class B telephone companies to keep a continuous and perpetual inventory of all the thousands of items in their telephone plant, originated in the Uniform System of Accounts promulgated for telephone companies by the Federal Communications Commission in 1935, effective January 1, 1936. The idea behind the proposition apparently is that such a continuing property record would obviate the necessity of ever making an inventory and appraisal of a telephone plant for rate-making and other purposes.

Independent companies objected generally to the maintenance of a continuing property record. They held that such a record would not only be expensive—costing not only a large amount to establish, but also in many cases more than $1 a year per station to maintain—but that it would represent a useless expense, because it is impossible to keep a record of this kind so meticulously correct over a period of time that it could be used as a satisfactory substitute for actual inventory of the units and value of the property. They objected to imposing this additional expense on their patrons—since the subscriber must in finality pay all the expenses — when it served no practical purpose.

In consequence apparently of objections, or due to the lack of development of any practical plan, the F. C. C. postponed the effective date of the completion by telephone companies of their continuing property record. At present the order is that the record shall be complete by June 30, 1941.

A number of the state commissions have adopted the F. C. C. Uniform System of Accounts for Telephone Companies in toto, including, of course, the requirements as to the continuing property record. When so adopted by a state commission, the F. C. C. accounting rules apply to every Class A and Class B telephone company in that state, whether or not that company is subject also to the F. C. C. The purpose of the state commission in adopting the F. C. C. system in its entirety was, in many cases, to have uniformity in the accounts and reports of all telephone companies in the state.

The Nebraska Commission had adopted the F. C. C. accounting system for all telephone companies in Nebraska. This Commission is now, of its own motion, relieving telephone companies in Nebraska that are not subject to F. C. C., from maintaining a continuing property record.

This action by the Nebraska Commission is, it seems to us, more important than the mere act of relieving these Nebraska companies of the onerous duty and unnecessary expense of keeping this record—although that is important enough. This act is a straightforward move by an alert state commission in the direction of state regulation more productive of public good.

IN ITS enactment in 1934 of the law creating the F. C. C., the Congress specifically excluded from the jurisdiction of that Federal body—by the well-known "2-b-2" clause—the great majority of Independent telephone companies. The regulation of these companies was left, and properly so, to the state commissions, who know, far better than any Federal agency can, local conditions affecting these comparatively small companies.

Certainly there is no virtue in uniformity of accounts and statistics so great or valuable that it justifies burdening the patrons of a local telephone company, or the company itself, with non-productive expense. We hear a great deal about keeping down the cost of telephone service to the public. One way to keep down that cost is to keep down the cost, to the telephone companies themselves, of their regulation.

The Nebraska Commission is pointing the way to regulation of local companies designed to fit the situation of local companies. If carried to its logical conclusion by state commissions, this principle will result in more efficient, more smoothly functioning and more economical regulation of thousands of Independent telephone companies not subject to Federal regulatory jurisdiction, all to the general good of telephone users, the telephone companies and, incidentally, the state commissions themselves.

We venture that these thousands of Independent telephone companies want to see these state commissions function on their own, because these companies want to see state commissions continue in existence. These companies want their regulatory problems, which are mostly local problems, settled at home.

The Nebraska State Railway Commission is entitled to the thanks of Independent telephone companis throughout the country for is initiative and its forward-looking action in starting the ball rolling in the right direction.

Short Course in Telephone Transmission

By
B. C. BURDEN

Vacuum Tube Characteristics Historical and General

General

It is a conservative statement to say that the vacuum tube is the most important single item in the electronic field today. The vacuum tube is the most versatile electric device known to man. It serves not one art but many. It is used in the radio and power fields, it permits long distance telephony, it is indispensable in physics laboratories, it has made possible extremely sensitive measuring instruments, it has given us sound moving pictures, without it there would be no television and it has to its credit a host of other applications.

From what has just been said, it is evident that the Transmission Engineer, be he engaged in the radio, public address, or photo-electric field can ill afford to have other than a complete knowledge of this most important device. The three principal applications of the vacuum tube are (1) its ability to generate alternating current of any desired frequency, (2) its amplifying properties, which permit its use to increase the magnitude of voltages connected to it, (3) its rectifying properties, which enables it to change alternating current into direct current and to detect (partial rectification) high frequency radio waves converting them from the inaudible high frequency form required for radio transmission to the audible or low frequency form required for human hearing.

History of the Vacuum Tube

We will not take up valuable space in discussing vacuum tube history. It is interesting; however, to know that it was Thomas A. Edison who in 1883 made an observation that lead to our present day vacuum tube. At that time, he discovered that current could be made to flow from the filament of his carbon lamp to a metal plate located in the same evacuated bulb but insulated from the carbon filament. He further observed that it was necessary that the metal plate be connected to a positive terminal of the lamp filament in order for current to pass between *filament* and *plate*. This early discovery of Edison's and which is known as the "Edison Effect" is illustrated schematically in Figure 1-C.

Fig. 1-B.—Special Type of Tube Used on Ultra-High Frequencies

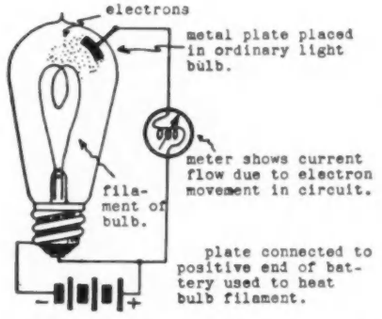

electrons
metal plate placed in ordinary light bulb.
meter shows current flow due to electron movement in circuit.
fila-ment of bulb.
plate connected to positive end of battery used to heat bulb filament.
–
+

Fig. 1-C.—Edison's Early Discovery of Electron Flow

In 1905 Professor J. A. Fleming of London, England suggested that Edison's discovery could well serve as a detector of radio waves in place of the galena crystals then in use. At that time, he developed what was known as the Fleming Valve. It consisted of an evacuated glass tube containing a filament and a plate.

DeForest's Three-Element Tube

Dr. DeForest, an early radio experimenter, in 1907 developed a vacuum tube with three instead of the usual two elements suggested by Fleming. The third

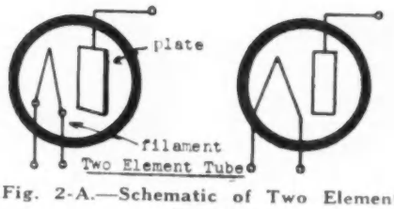


Fig. 2-A.—Schematic of Two Element Tubes

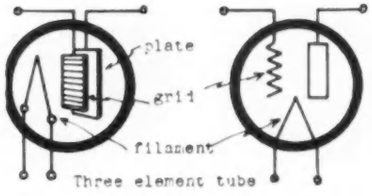


Fig. 2-B.—Schematic of Three Element Tubes

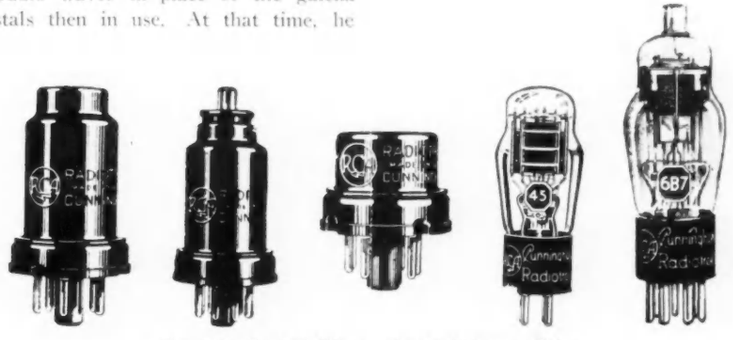


Fig. 1-A—Typical Glass and Metal Vacuum Tubes

element consisted of a fine wire grid located around the filament and between the filament and the plate. Figure 2-A and 2-B illustrates the difference between the two- and the three-element tube.

Faults of Early Tubes

The two- and three-element tubes developed by Fleming and DeForest were imperfectly evacuated, that is, they contained an appreciable amount of air although as much air was taken out as was possible with the equipment available at that time. The effect of the remaining air in the tubes was to make them erratic in behavior. No two tubes had similar characteristics.

Recognizing the need for complete evacuation, Arnold and Langmuir each working independently of one another developed a method that greatly improved the vacuum. As a result of this work, a patent was issued to Langmuir on the high vacuum tube in spite of the fact that DeForest had previously been issued a basic patent on the three-element vacuum tube. Constant litigation took place between the two contenders and it was not until May 25, 1931, that the controversy was settled by the United States Supreme Court's decision in which it was held that DeForest's original patent was valid and the Langmuir patent invalid.

Theory of Electron Emission

Since the original two and three element tubes of Fleming and DeForest, the vacuum tube art has made great strides. Now tubes are available having as many as eight to ten elements as compared to the original two and three element types. In general, however, all vacuum tubes operate in much the same manner and it is necessary for the technician to study first the basic action and theory of simple tubes and then the specific characteristics, applications, and individual peculiarities of the many common tubes of tubes now available.

Vacuum Tube Terms

The term vacuum tube as commonly used, refers to those tubes having some form of heated electron emitter and with one or more additional elements through which the electrons flow and are controlled. Tubes are available which are of the glow type and which do not have heated filaments. In general, these tubes are not referred to as vacuum tubes but by other names such as glow discharge tubes.

In classifying vacuum tubes, we refer to them as two, three, four, etc. element tubes. The term element refers to the individual parts of the tube as, for example, the grid, the plate, filament, cathode each constituting one element. Dressed up engineering terminology often refers to the various types of tubes by the names diode, triode, tetrode, and pentode. These terms referring to the two, three, four, and five element tubes respectively. Figure 3 illustrates these terms.

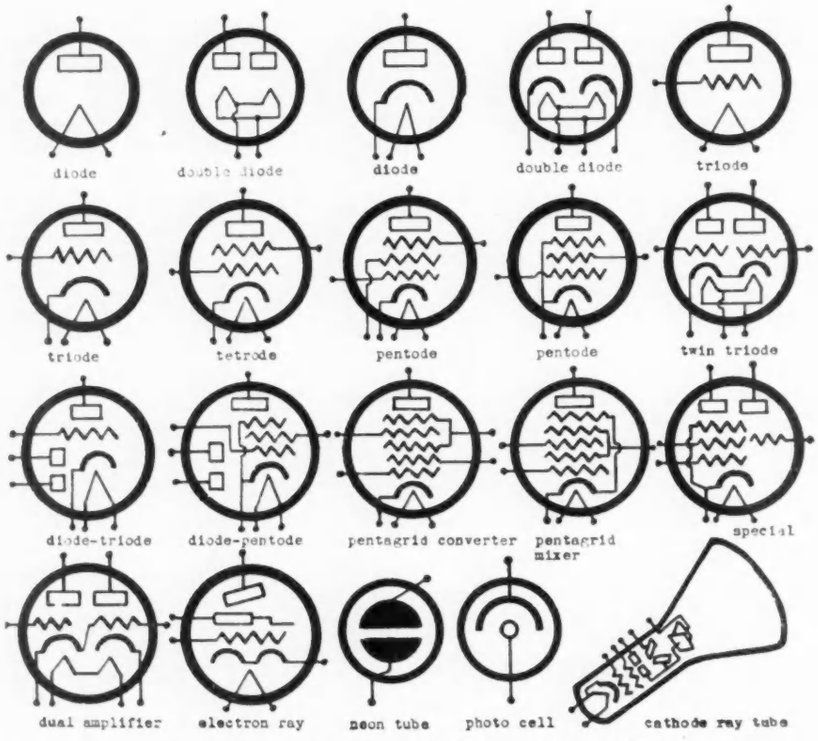


Fig. 3.—Element Arrangement in Different Types of Tubes

Any vacuum tube may be considered as consisting of a source of electrons, one or more grids which control the flow of electrons, and a plate to which the electrons are attracted. Actually in many circuits, some of the grids may serve other purposes than the direct control of electrons and in some cases collect electrons themselves in the same manner as does the plate.

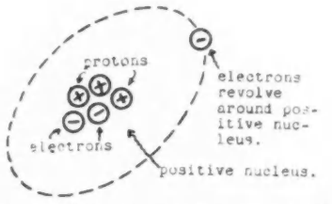


Fig. 4.—The Electron Theory of Matter

Electronic Theory of Matter

If we are to explain how electricity can be made to flow through a vacuum we must say something of the electronic theory of matter. Scientists believe that all matter is made up of small particles of negative and positive electricity. The negative electricity particles are referred to as electrons, and the positive as protons. It is thought by scientists that each atom of matter consists of a positive neucleus having both protons and electrons around which revolve free electrons in a planetary or eliptical orbit much in the same manner as the various planets revolve around the sun. This theory is illustrated in Figure 4. Under certain conditions, it is possible to release some of the free electrons and to draw them away from the material from which they are thrown off or emitted (the term emit means to eject or throw off.)

Electronic Emission

It was discovered that for materials to emit electrons easily it was necessary to elevate the temperature of the material. It was further determined that inasmuch as the free electrons thrown off by a heated surface were negative in character, that is, had a negative electrostatic charge, that if they were to be kept from being pulled back into surface from which they were emitted that some positive force of adequate voltage would need to be placed near-by to attract them. From this it can be seen that Edison in his early observation was witnessing electronic emission due to the electrons thrown off by the heated filament being attracted to the plate within the bulb when the plate was connected to the positive side of the filament heating battery.

Ed Note.—Mr. Burden will continue this article in his series in the December 15 TELEPHONE ENGINEER.

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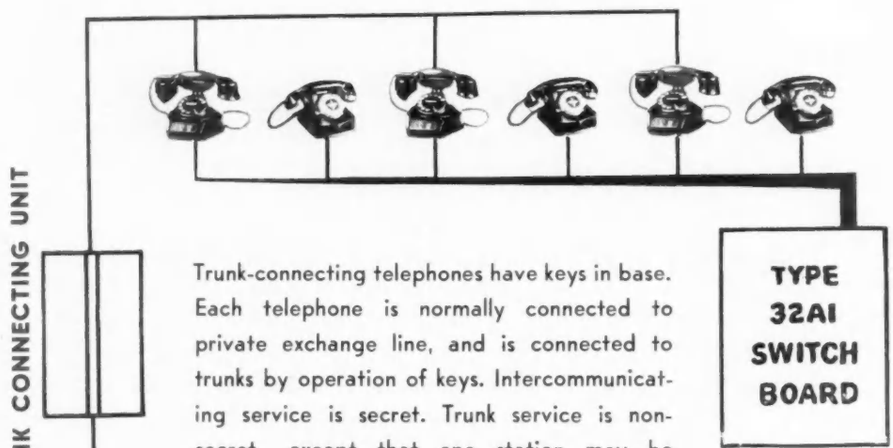

Trunk-connecting telephones have keys in base. Each telephone is normally connected to private exchange line, and is connected to trunks by operation of keys. Intercommunicating service is secret. Trunk service is non-secret except that one station may be provided with secret service if so desired.

Trunk calls can be transferred from one trunk-connected telephone to any other by calling over the intercommunicating circuit and asking the wanted party to pick up the call.

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Write for further information and sample promotional material for this and other P-A-B-X's — then plan to take advantage of the modern demand for the services which these units provide!

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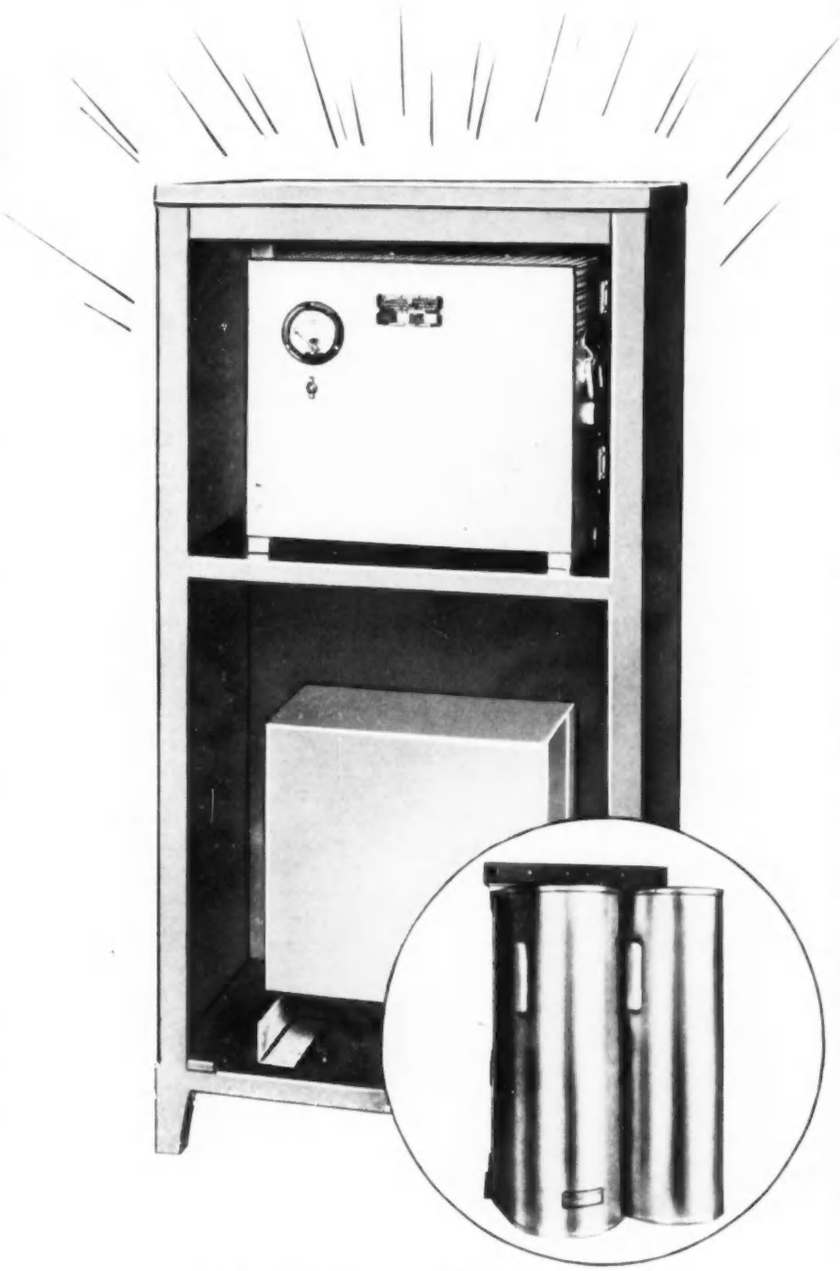

The Type 32A1 P-A-B-X, shown above with trunk-connecting unit in circle, has a capacity of 10 local lines, 2 trunks, and 4 simultaneous conversations (2 local, 2 trunk).

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ESTIMATING

Construction Costs

By JAY G. MITCHELL

The Author

In this installment the author discusses estimates for open wire construction, sample formula for open wire estimates, illustrates labor man hour relatives for exchange iron wire construction, cable splicing with typical analyses of the operations involved in straight and branch splices, miscellaneous material, terminal costs, proof testing and final attainment of accuracy.

THE cost of open wire construction is easily computed when handled as an entirely separate element of the estimate. It is important, of course in cost estimating when the maximum practical accuracy is sought, to identify and include, with their proper weights, all elements of the material and labor components. The estimate for open wire construction illustrates this clearly. In the estimated *material cost* of the completed open wire should be included all associated identifiable material (definitely enumerated) such as insulators and tie wires, the quantity of which is determined by the number of poles per mile, splicing sleeves, the quantity of which is determined by the number of standard coils of wire and the number of transpositions per mile, Miscellaneous Material which includes supplemental supplies required per mile because of extra poles inserted in the lead to provide special road clearances, insulated wire sections and other similar conditions certain to be encountered in open wire construction (Miscellaneous Material is preferably expressed as a per Cent. of the primary and listed material) and Construction Loss (Damage, Loss and Shrinkage). If extreme accuracy is to be attempted it may be possible to demonstrate that the allowances for Miscellaneous Material and Construction Loss are different in city construction and in rural or toll construction.

It is the opinion of the author, however, that such attempted meticulous refinement in these two items of the material cost of open wire is not only not justified by the facts but might be difficult to sustain by the record of experience. It is true also that the material for which the cost is computed by the use of allowances for Miscellaneous Material and Construction Loss, is at least in part, often the same kind of material as that covered by the accounting classification Exempt Material. The inclusion of the cost of this class of material by the use of per Cent. allowances specifically applied to distinct portions of the plant makes for accuracy to a much greater extent than other methods of spreading these costs over **all parts** of the plant in a uniform ratio. The importance of these two cost classifications in the making of construction estimates is given emphasis in connection with the subject of open wire construction because it is easily apparent and simple in that element of the plant.

The man hour relatives for open wire construction are very simple and are subject to successful proof testing because of the great number of work orders for this kind of construction available in every plant and also because the methods of placing new open wire are, to all intents, fully standardized.

A typical set-up for the estimate of cost for open Aerial Wire is shown in table "A."

FOR the construction operations of any given company the estimated cost of Aerial Wire as computed by some such formula as that shown in the table (like all similar tabulations in this series merely illustrative of methods and not of universally applicable results) must be checked against the recorded actual experience. Thereafter the process of compiling the estimates may be considerably shortened by the use of composited loading and overhead ratios. Careful current check of completed estimates with the recorded experience

TABLE "A"

Aerial Wire
Typical Formula for
Estimated Cost per mile in place

	Item	Unit	Cost
A	Wire	Mile	
B	Freight on A	Mile	
C	Insulators	Mile	
D	Sleeves	Mile	
E	Subtotal		$———
F	Miscellaneous Material 2.5% of E		
G	Subtotal		$———
H	Construction Loss 2.0% of G		
I	Subtotal		$———
J	Supply Expense 3.4% of I		
K	Total Material		$———
L	Direct Labor		
M	Plant Supervision 10.25% of L		
N	Incidentals 26.30% of L		
O	Engineering and Engineering Supervision 5.80% of L		
P	Vehicle and Other Work Equipment ($1.75 per 10 hours of direct labor)		
Q	Total Labor	Mile	$———
R	Total Direct Cost (K plus Q)		
S	General Expense, Auditing and Administration 1.30% of R		
T	Workmen's Compensation 2.50% of L		
U	Public Liability 1.74% of R		
V	Total Cost	Mile	$———

of the company is usually currently maintained and discrepancies between estimate and experience should be thoroughly analyzed to the end that corrections in labor hour relatives and material and labor, loading per Cents, may be made if experience discloses their inaccuracy. Of course this comment is pertinent to any system of estimating cost in advance of the construction work and to any department or division of the plant. (See Table "B").

TABLE "B"

The following tabulation is given as a developed system of man hour relatives for the direct labor of placing Exchange Iron Aerial Wire:

Iron Bare				
14	B. W. G.	.083	99 lbs. mile	10.0 Man hours per mile
12	B. W. G.	.109	170 lbs. mile	10.5 Man hours per mile
10	B. W. G.	.134	258 lbs. mile	14.7 Man hours per mile
9	B. W. G.	.148	314 lbs. mile	15.0 Man hours per mile
8	B. W. G.	.165	390 lbs. mile	15.3 Man hours per mile
Insulated				
16	B. W. G.	.065	120 lbs. mile	3.0 Man hours per 1000 ft.
14	B. W. G.	.083	175 lbs. mile	3.0 Man hours per 1000 ft.
12	B. W. G.	.109	260 lbs. mile	3.8 Man hours per 1000 ft.
10	B. W. G.	.134	400 lbs. mile	4.0 Man hours per 1000 ft.
Tree Wire				
16	B. W. G.	.065	120 lbs. mile	3.0 Man hours jer 1000 ft.
14	B. W. G.	.083	175 lbs. mile	3.0 Man hours per 1000 ft.
12	B. W. G.	.109	260 lbs. mile	3.8 Man hours per 1000 ft.
10	B. W. G.	.134	400 lbs. mile	4.0 Man hours per 1000 ft.
Steel				
8	B. W. G. (River Crossing Construction)	.165	388 lbs. mile	15.3 Man hours per mile

The cost of Aerial Cable may be estimated by an application of exactly the same system as that used in estimating the cost of any other type of construction. In the material it is necessary to include all elements and loadings, such material as splicing paper or cotton sleeves, solder, parafin and similar items being included as Miscellaneous Material. The item of Construction Loss is especially important in cable construction especially because of the very definite and unavoidable reduction from reel to the finished cable (length) due to splices. In the labor component of the cost the greatest accuracy is obtainable by making a preliminary study to determine the number of cable pairs that are to be spliced at random, the number spliced straight, the number cleared and sleeved and the number that must be identified in splicing. There is a very substantial difference, of course, in the man hour relatives applicable to each of these normal splicing operations. A typical result of such an analysis of splicing operations is shown in table "C."

TABLE "C"

Straight Splices		
Pairs involved (Paper Insulated)	222234	100.00%
Pairs identified in splicing	6237	2.81%
Pairs cleared and sleeved	26663	11.99%
Pairs straight spliced	195587	88.01%
Branch Splices		
Pairs involved (Paper Insulated)	238846	100.00%
Pairs identified in splicing	43149	18.07%
Pairs cleared and sleeved	28951	12.12%
Pairs straight spliced	109696	45.93%
Pairs bridged	80575	33.74%

A study of this sort is used, of course, in weighting the labor man hours to meet the conditions obtaining in the average cable splice of each kind. Typical man hour relatives on the basis of this study and including wiping are shown for a few common kinds of cable in Table "D."

TABLE "D"

Straight Splices	
11 Pair 22 Gauge (Direct Labor)	4.551 Man Hours
26 Pair 22 Gauge (Direct Labor)	5.200 Man Hours
51 Pair 22 Gauge (Direct Labor)	6.216 Man Hours
101 Pair 22 Gauge (Direct Labor)	8.338 Man Hours
202 Pair 22 Gauge (Direct Labor)	12.581 Man Hours
Branch Splices	
11 Pair 22 Gauge (Direct Labor)	4.793 Man Hours
26 Pair 22 Gauge (Direct Labor)	5.853 Man Hours
51 Pair 22 Guage (Direct Labor)	7.501 Man Hours
101 Pair 22 Guage (Direct Labor)	11.003 Man Hours
202 Pair 22 Gauge (Direct Labor)	18.096 Man Hours

In the material component of Aerial Cable it is the author's opinion, although there is a difference of opinion on this point, that the messenger, rings and hangers, bonds and dead end extensions of the messenger are preferably included on an average basis, per 1,000 feet of finished cable, expressed in feet and quantities per unit length of finished cable. By this method it is of course necessary to include the labor man hour relatives associated with such items of material in the estimate for the entire Aerial Cable project. The alternative to this method is the preparation of a separate estimate for the cable on the one hand and the messenger and cable supporting plant on the other. Executive consideration of the estimate can be most readily given, it seems, when the entire project is presented in one estimate, all coordination and allocation of material and labor having been made.

AERIAL Cable estimates should, it appears, comprise the estimated material and labor cost of the installation of the associated terminals. It seems to be permissible, in considering Aerial Cable terminals, to assume that a branch splice is required for each terminal. In many cases the terminal splice can be incorporated into a branch cable splice or into a reel length splice but in such cases the cost of the primary splice is affected by the inclusion of the terminal splice, which calls for identified pairs almost without exception to such an extent, although there is some difference of opinion on this point, as to offset the error inherent in the assumption of one branch splice for each terminal. Bonds and grounds can, most accurately, be included in the estimate on the basis of a definite number of each per 1,000 feet of finished cable. When the estimates are compiled on this basis and are proof checked with completed projects the estimating engineer will soon have available a set of overall average cost figures for each common type of cable in the plant of his company. Such average figures, once fully verified, are an extremely valuable aid thereafter, in short cut and

LINE and DESK

RAY BLAIN, Editor

ADDRESS YOUR QUESTIONS TO LINE AND DESK EDITOR. NO CHARGE.

Q. It is considered good practice to paint cable forms on a main frame with shellac?

A. No shellac on forms of this type is no longer considered desirable. The cable should merely be boiled-out with beeswax or paraffin and then laced into a form.

Q. What location should be used for the installation of grade clamps on the end of a cable lead?

A. When the terrain is such that grade clamps are considered necessary they should ordinarily be installed about 4-feet from the last pole where the cable is terminated.

Q. We are in need of some mechanical protection of telephone wiring in a machine shop. What would you advise?

A. We assume that you refer to the wiring from the drop entrance to the telephone. We are of the opinion that either rigid conduit or metal moulding should be your best protection.

Q. What type of pole balcony is considered desirable for use with a 25–pair cable terminal?

A. Pole balconies or seats are not ordinarily considered necessary with small sizes of cable terminals because a man can work from a belt and safety the short time ordinarily required for any work necessary as such a terminal. Large cross-connecting terminals should be provided with a pole balcony equipped with a railing for safety.

Q. What type of anchors are recommended for use with lag screws to attach cable fixtures on a brick wall?

A. Ordinary we believe that a good malleable lag screw shield will prove entirely satisfactory. A good type of of malleable iron shield is easily and quickly set into a hole drilled for that purpose. Stress is centered on the threads, each shield being precision made with deep accurate threads designed to fit any standard lag screw.

Q. We have a light installation truck with the ladder rack mounted on the side which has not proved at all satisfactory. Will you please advise us how we may change this to the top mounting variety at a reasonable cost?

A. We would suggest that you consult the manufacturers of your light installation truck body with a view of purchasing the top mounting ladder rack. You could fabricate this rack locally with angle iron but in view of its low cost we are of the opinion that its purchase will prove more desirable.

Q. In the construction of aerial cable should a nut be placed on the bolt against the pole and then a second nut used to hold the cable suspension clamp in place?

A. In most cases when a through bolt is used to attach the messenger to the pole the suspension clamp serves as a washer. When double end bolts are used so that a cable may be suspended on each side of the pole, double nuts are used. The inside nuts are tightened against the pole on washers and then the second nuts are used to hold the suspension clamps in place.

Q. When using a rod for a ground may the resistance be decreased by driving it to a greater depth?

A. Various tests have indicated that a longer rod makes a much better ground. One such test made in clay indicated a resistance of 140 ohms with an 8-foot rod, 45 ohms with a 16-foot and only 15 ohms with a 24-foot. In sand and clay an 8-foot rod measured 200 ohms, 16-foot 22 ohms and 24-foot only 11 ohms. This should tend to indicate clearly that the long rod is a decided advantage when a good ground connection is required.

Q. What type of cable jacks are considered best for general telephone work?

A. Most any approved type of screw jack is considered satisfactory if of adequate size to handle the cable reel being used. However, we are of the opinion that a cable reel trailer is much to be preferred when any amount of cable work is being performed. The trailer is not only safer but may also be used to transport heavy reels to the job and are much more convenient for placing the reel into position to make ready for pulling cable into either conduit or aerial rings.

Q. Will you advise how steel messenger strand may be cut to proper lengths out on line construction jobs?

A. The outer wires of the strand may be nicked with a file and then bent sharply a time or two while one end is being held with a pair of connectors until broken. It may be necessary to nick the center wire after the outer layer has been broken. A pair of good bolt cutters may also be used to cut strand. Before cutting with either method the strand should be bound with friction tape to prevent the strands spreading.

Q. When driving extra long ground rods in hard ground considerable trouble is experienced due to the whip in the rod. Can you advise us how this may be avoided?

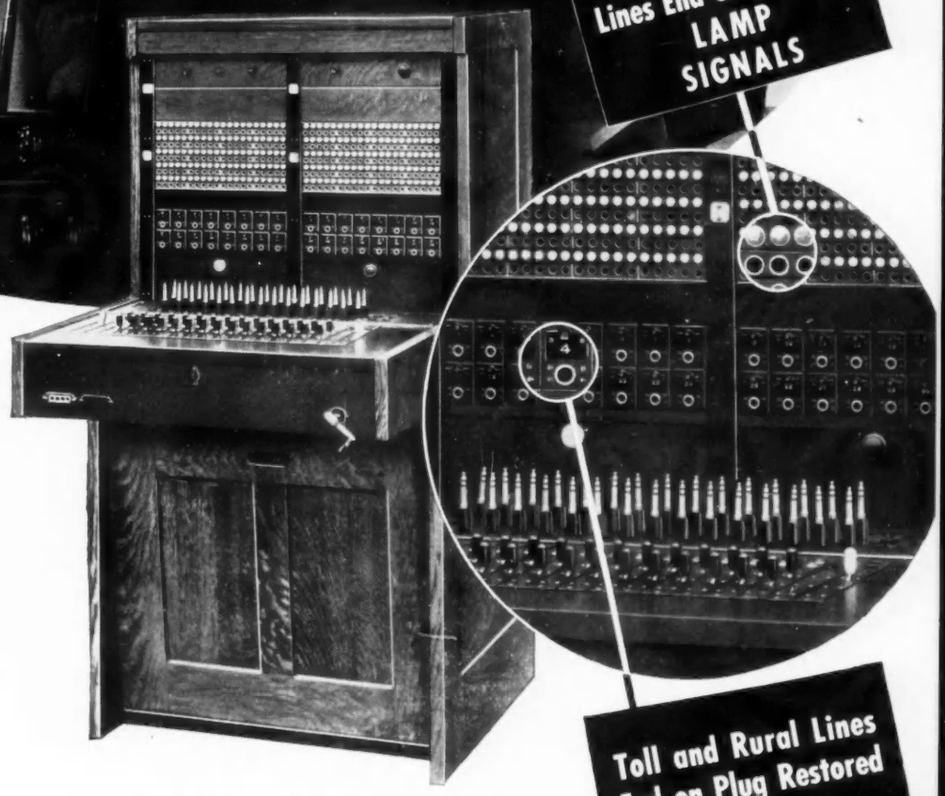
A. One arrangement used with considerable success by several companies consist of a length of pipe partially filled with lead which is slipped over the ground rod and serves as a brace as well as a hammer until the rod is partially driven. A larger ground rod might also assist you in overcoming this difficulty. There is also on the market a "U" shaped ground rod which it is claimed is so rigid that whip in driving is practically eliminated.

Q. We are planning on the use of 1-pair, lead covered, rubber insulated, cable for distribution from main feeder cables to residences in a certain section of our exchange and would be pleased to know whether this type cable may be spliced direct into the main cables which are of the paper insulated type?

A. While this is possible and sometimes done the practice is not generally recommended. The underground type, or stuffing box weatherproof terminal may be mounted in a manhole and the small distribution cables connected into it. This provides greater flexibility and makes repairs much easier should the distribution cables ever develop trouble. The water proof terminal may now be obtained in various practical sizes at a reasonable cost.

Q. When a sealed chamber terminal is installed in a small wall cabinet how should the cable be spliced to the terminal stub?

A. Sealed chamber terminals can be obtained equipped with a 25-foot stub and this may in the majority of cases be used to avoid making a splice in the wall cabinet. When the run to the main cabinet is greater than 25-feet, terminals without stubs can be obtained if desired and made up on the job. When a splice must be made in a small cabinet a butt or knuckle joint is usually considered the best.


Local Central Energy Lines End on Compact LAMP SIGNALS
Toll and Rural Lines End on Plug Restored DROP SIGNALS or LAMP SIGNALS

THE STROMBERG-CARLSON NO. 106 NON-MULTIPLE SWITCHBOARD PAVES THE WAY TO *INCREASED RATES*

Operating companies in smaller communities have found subscribers willing to pay increased rates . . . and public service commissions willing to grant them . . . after they have installed the Stromberg-Carlson No. 106 Non-Multiple Switchboard. It enables the exchange of 400 lines or less to give *metropolitan* service.

The board can be installed in either one or two positions, with an ultimate capacity of 400 central energy local lines and 96 toll or rural lines in two positions.

When the Stromberg-Carlson No. 106 Non-Multiple Switchboard is installed, there is no need for batteries on subscribers' premises; rural subscribers are not annoyed by ring-off signals on the connected line; uniform battery supply is maintained for operating local lines, and the operator is provided with positive supervision on all connections.

A Bulletin describing in detail how this switchboard will permit you to give better service and obtain increased rates entails no obligation. *Write for your copy.*

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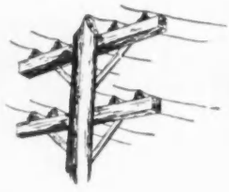
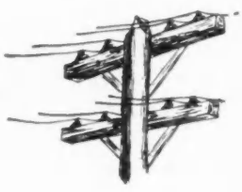


LONG LINES



R. A. Clark, Jr.

In this the third article of a series discussing carrier telephone and telegraph applications, a convenient method for planning and lining up a carrier system is discussed.

In the previous article curves were included showing the losses at carrier frequencies on open wire and cable circuits. With this information available it is possible to plan a carrier system so that the correct number of repeaters will be installed and proper adjustment made.

Fig. 1 shows a level diagram which should be made up for each channel of the carrier system. The example shown in this figure includes cable and open wire such as found in a typical circuit. One repeater is included which is adequate for the conditions encountered. The losses assumed in making up the diagram are as follows:

Loss per mile	8KC	20KC
Open Wire.....	.08	.12
Cable	1.4	1.7

These losses are taken from the curves shown in the previous article. In making calculations on carrier telegraph circuits the exact frequency used on each telegraph channel should be computed. On carrier telephone channels the frequency at 1,000 cycles equivalent voice frequency should be employed. For example, in the illustration shown on the diagram if the lower side bands were used the east-west carrier frequency would be 9 KC and the west-east carrier frequency 21 KC. If the upper side bands were used the east-west carrier frequency would be 7 KC and the west-east carrier frequency 19 KC. On systems using carrier for ringing it is very convenient to plot the curve on the basis of the ringing signal used. The diagram in Fig. 1 is based on an output level of +10 db. This is a convenient value to use as it is easily remembered and it works out quite well on most circuits. Local conditions may govern somewhat, also the type of carrier apparatus, some of which operate at somewhat higher levels than others.

The level diagram show in the figure is based on the use of matching transformers at the junction of the cable and open wire; also between the equipment and the cable. Matching transformers introduce a loss of about ½ db which is shown as a vertical line at each junction point.

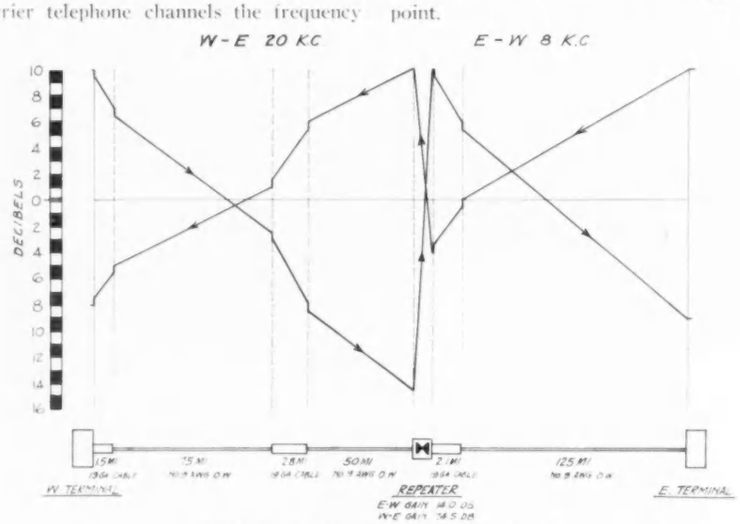
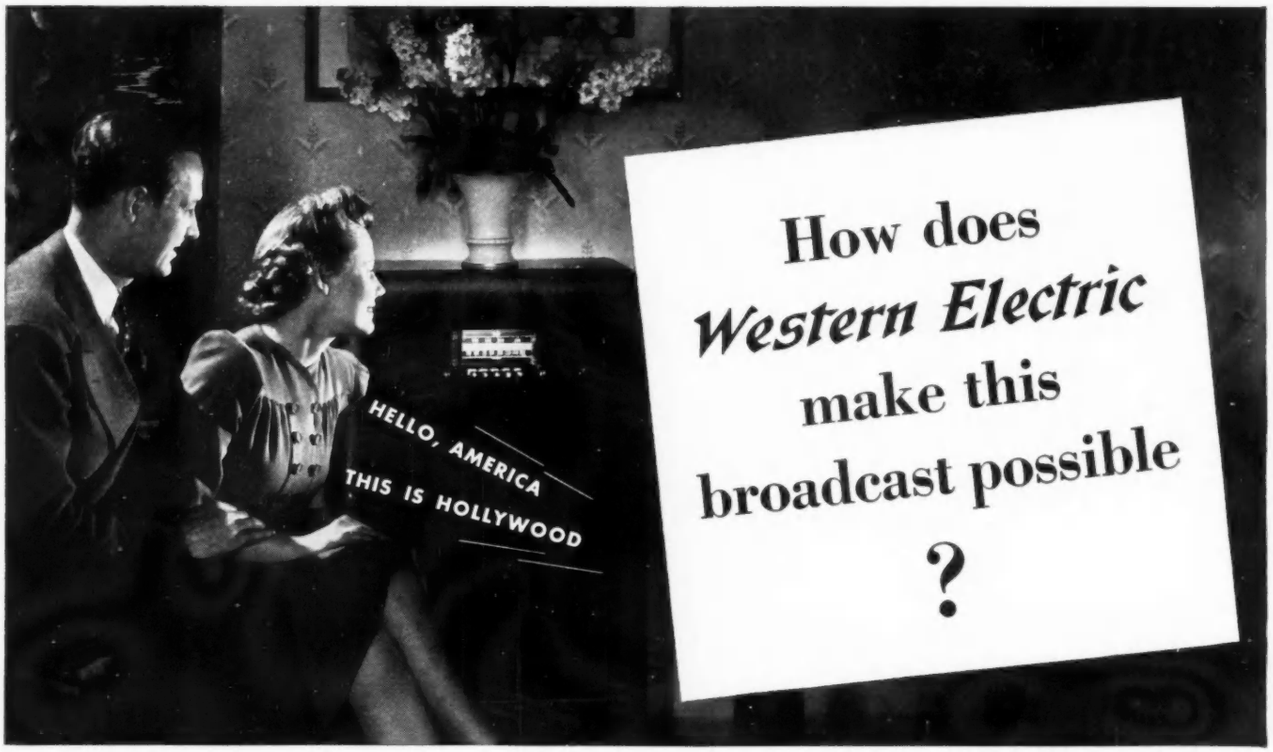


Fig. 1—Level diagram for a carrier circuit.

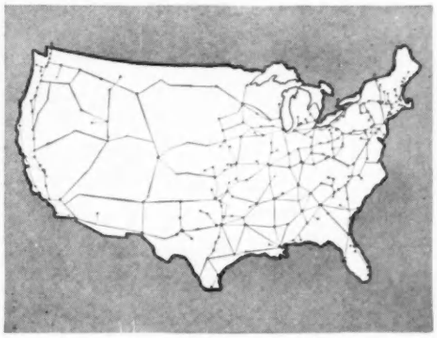
The plotting of the level diagram is not at all difficult and after following through the example below there should be no difficulty in preparing the diagram of practical circuits encountered. We will go through the calculations of the east-west channel. Starting at the west terminal the output is assumed to be +10 db. The loss in 125 miles of No. 9 AWG open wire is exactly 10 db so that the level at the junction of the cable and open wire will be zero. The matching transformer at this point introduces ½ db loss. The cable itself consisting of 2.1 miles of 19 ga. introduces a loss of 3 db, the matching transformer at the repeater point another half db making a total of 4 db. The level of the 80 KC signal delivered to the repeater is therefore -4 db. By adjusting the repeater gain to 14 db the signal leaves at a +db level. Fifty miles of No. 9 AWG open wire introduces 4 db loss bringing the level down to +6 at the east end of the 2.8 mile section of cable. The cable and transformer computed as before amounts to 5 db, 4 db in the cable and 1 db in the two matching transformers. Therefore the level at the west junction of the cable and open wire is +1 db. The loss in 75 miles of No. 9 AWG open wire is 6 db bringing the level down to -5. The cable and matching transformer loss at the west terminal computed as before is 3 db, 2 db in the cable and 1 db in the matching transformers. Thus the 8 KC signal arrives at the west terminal at a -8 db level. The west-east loss may be plotted in the same manner using the 20 KC equivalents shown above.

Upon completion of a carrier installation the carrier terminals should be adjusted to give the desired outputs and transmission measurements made to check the computed diagram. If the results do not agree, sectionalized tests should be made to locate the source of trouble.

The diagram shown in Fig. 1 is based on dry weather equivalents in the open wire line. In laying out a system it is desirable to plot a level diagram for the wet weather conditions as well so that sufficient margin is maintained to take care of increased losses when they occur.

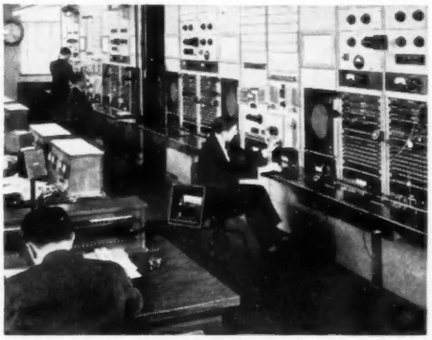


In the development of radio—that important influence in modern life—Western Electric equipment has played a big part.



Here are the main routes of the high quality Bell System lines employed in broadcasting service. The "network broadcast" travels over these wires.

The thousands of miles of wire and cable, the poles, the countless items of apparatus were supplied by Western Electric, manufacturer and purchaser for the Bell System.

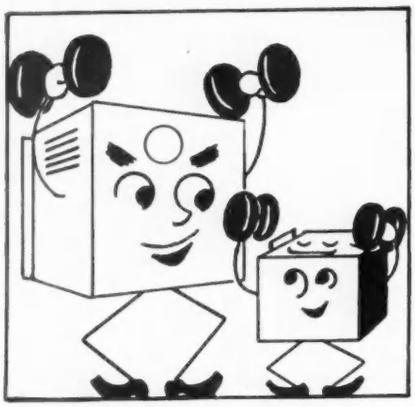


Telephone company 'control offices' like this one, Western Electric equipped, are located at important cities. They switch the network program to selected broadcasting stations.

To keep the program at full brilliance, Western Electric vacuum tubes at "repeater stations" amplify the electrical impulses with complete fidelity.

So, out of the telephone art has come much of broadcasting's plant. This apparatus is made by Western Electric with the same skill as your Bell Telephone.

Western Electric *. . . is back of your Bell Telephone service*



Batteries stay fit, never get exhausted or over-charged with a Raytheon RectiChargeR on the line. Result: longer battery life, lower maintenance, and reduced power bills. RectiChargeRs maintain proper charging rate regardless of voltage variations in the AC supply. Set them and forget them.

Raytheon RectiFilteR

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Estimating Construction Costs

(Continued from page 29)

emergency estimating. When based upon detailed and carefully prepared estimates they may be assumed to be authoritative and valid for the company to whose construction methods and material specifications they apply.

ESTIMATES for the cost of Underground Cable have many features in common with those for Aerial Cable. It is the opinion of the author that splicing labor man hour relatives are the same for corresponding operations in both cases. There are much larger cables used in underground service, of course, than are normally found in Aerial plant and the labor man hour relatives for operations on these large cables has no counterpart in the labor relatives for Aerial cable. Composited and Quadded cables are, of course, found in both the Aerial and Underground plant. Splicing of such cables may be reduced to the system of labor man hour relatives just as the labor data for simple cable work may be systematized but the greatest care and the most thorough consideration of the disclosures of completed estimates is necessary. The same statement may be made in regard to advanced methods of cable testing and boiling out, chemical drying, gas testing and development of building out stubs. It is always to be remembered that the absence of a complete set of labor man hour relatives for any given group of operations merely affords the opportunity to utilize more primitive methods if necessary and then to develope such relatives as may be disclosed by recorded experience.

In developing the system of computing construction costs which has been outlined it may appear that too great emphasis has been placed upon the subdivision of the labor into very many operations of different identifiable characteristics. This is one of the basic steps in the compilation of later short cut composited figures which may be said to be valid for the conditions in any given plant. In the beginning there will be many detail operations which cannot be assigned their distinctive labor man hour relatives because no recorded experience is available. In such cases these items must be supplied by estimating the labor man hour relatives on the best basis of judgment available. When the project has been completed the recorded experience of the company may be analysed and the estimated labor relatives may be adjusted to reflect the actual experience. This method will ultimately exclude error in detail items and place the entire system on a basis of demonstrated experience. Estimates based on labor relatives which have been developed in this way will constitute an accurate and sustainable basis for determining the probable cost of projects under consideration, will inspire executive confidence because of the elimination of overruns and underruns and will, in the end, conserve time and effort.

BECAUSE of the increasing importance of maintaining accurate plant records, costs must be accurately determined for the several units of property. This is essential because retirements made with inaccurate cost figures may well result in troublesome and cumulative error in the books. For all these reasons it appears to be important that the engineer exert every effort to develope the most accurate possible system of cost figures, such cost figures to be primarily compiled in detail and then proof tested against recorded experience. When this has been done it is obvious that for given conditions and territories short cuts may be developed for day to day use. Such short cuts may consist of the consolidation of detail labor relatives into single composite totals provided the methods and standards of doing work remain unchanged. In the same way detail loading per Cents. may be weighted into single loading per Cents. for several items of loading provided they all have relation to the same unit of property and are all *invariably* involved in the total cost in the same way.

As has been pointed out several times such a system of labor relatives may be gradually refined and may become more and more valuable as time passes. Changes in payroll rates may be applied to standard construction operations without interfering with the basic man hour relatives. In fact the making of complete appraisals of entire public utilities properties has been attempted by the method of inventorying and appraising all the material and then reducing the labor portion of the appraisal to a grand total of man hours to which weighted average payroll rates were to be applied. While this method of making an appraisal is still somewhat open to challenge because of factors which it is unnecessary to discuss here there is no question that the method which has been sketched out for making construction cost estimates is accurate, economical of time and labor and very convenient after the system of labor relatives has been developed.

Widow of Thomas E. Watson Inaugurates New Ship-to-Shore Radiophone

One of the first test calls made over WFA, new ship-to-shore radiophone which will serve Florida's Central-West Coast, went to the widow of the man who assisted Alexander Graham Bell in the invention and early development of the telephone.

From her home at Pass-a-Grille, Mrs. Thomas A. Watson talked with R. W. Shriner, engineer of the Peninsular Telephone company, who was one of a party of technicians and engineers aboard the yacht Girlie K. of Tampa, off the Gulf coast. The new radiotelephone station, was being put through exacting tests in preparation for the inauguration of commercial service early this month.

During their conversation, Shriner asked Mrs. Watson if she remembered the first transcontinental call, made twenty-five years ago between Dr. Bell in New York and Mr. Watson making the trip and hearing Dr. Bell repeat the famous words first transmitted by telephone — "Come here, Mr. Watson, I want you."

It was the first time Mrs. Watson had used ship-to-shore telephone service, and she seemed pleased at the ease with which voices were transmitted and understood.

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Yes sir! QUIZZICUS will pay for all acceptable ideas that qualify for the feature right under this announcement. YOU have thought of many products—gadgets, etc., so here is your chance to earn a little money for your thoughts. Address your ideas to "Quizzicus," c/o TELEPHONE ENGINEER, 7720 Sheridan Road, Chicago, and if they "make" his feature you get $2.50 for each acceptable idea.

I WONDER WHY SOMEONE DOESN'T INVENT

by Quizzicus

Uniform clothing for Independent Telephone men to wear which will be neat and serviceable but sell at a reasonable price. (Milkmen, truck drivers and in fact most all other public workers wear uniforms so why not telephone men.)

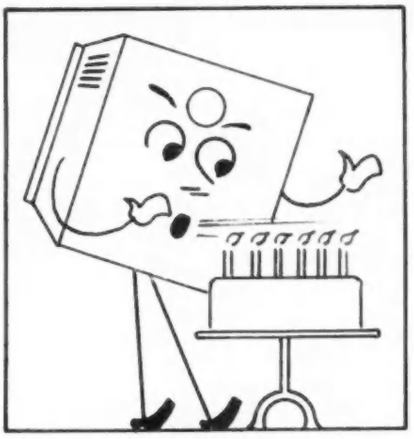
A form for moulding a prefabricated manhole in sections of concrete so that it can be built-up on the job without the aid of tools.

A duct wire shaped thus + which will be strong but at the same time light in weight.

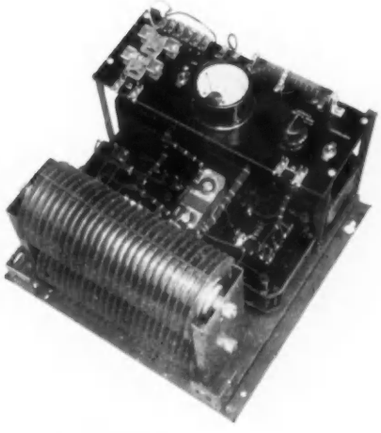
A tool somewhat like a pipe cutter but equipped with rollers instead of cutting wheels to be used to depress cable rings in a cable sheath to use in the making of duct splices and to anchor sheath more firmly to the conductors for a hard pull.

An electric clock which can be seen for a distance and arranged for mounting on a line construction truck so that linemen may know the time without the difficulty of looking for a watch hidden somewhere under a linebelt.

(Quizzicus is anxious to have YOUR suggestions on products that will make your job easier and improve the telephone art. Address your suggestion to Quizzicus c/o TELEPHONE ENGINEER.)



Raytheon RectiFilteRs have been in service six years. Actual performance records of many telephone companies have proved these units to be the most satisfactory and economical way of supplying DC to PBX and PAX boards. Plug in a RectiFilteR and forget it.



RectiChargeR with cover removed

A RectiChargeR with a small storage battery floating across its terminals makes a complete, automatic, AC-DC, constant-voltage telephone power unit. Components are long-lived, maintenance-free. Consult your usual source of telephone supplies for the correct RectiChargeR for your needs. Write for bulletin DL-48-263ATE

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Automatic Electric loud ringing bells are ideal for factories, power houses, lumberyards, construction projects, and other noisy locations. You can get them in several types, straight line or harmonic, for indoor or outdoor service on magneto or common battery lines.

It's easy to file rates for loud ringing bells, and their extra earning power will help bring your percentage of net to a more satisfactory level. Write today for further facts.

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Browsing at the National Convention

(Continued from page 19)

In the National Carbon room we see Eddie Schulz, New York; E. B. Overshiner, Chicago; Clyde Burge, Beatrice, Nebraska and K. B. Cary, Lincoln, Nebraska.

Miles, Al Parlett, Mr. Brown, Red Parsons and Mr. Boal.

Mr. J. K. Johnson, able Secretary of the Independent Pioneers Association, was present and had the affairs of our association under control as usual. Mr. Johnson and the committee are to be congratulated on another very successful banquet, entertainment and dance.

Mr. George S. Blake, Chief Plant Accountant for the Associated Telephone Company, Ltd., of Santa Monica, California, attended the convention as a guest of the Pioneers Association which was a reward for having obtained 68 new members. This membership drive was sponsored by the Associated Telephone Company which now has a total of about 200 active pioneers among its employees. It now plans on chartering a local Chapter of Pioneers.

MR. RICH of Telkor, Inc., was on hand to explain the many advantages possible by the use of the Tele-Spot in locating cable trouble. This test set makes use of vacuum tube amplifiers and a loud speaker. No doubt this is the cable fault locator we have been waiting for all these years.

K. W. Caldwell, the Texas Creosoting Co. man was making himself popular by passing out delicious pralines and entertaining visitors to his room with movies about the big state of Texas.

The Plant conference held on October 17th under the direction of Walter Dakin, Chairman, was one of the most successful of all times. Over 130 men were in attendance and interesting papers were presented by Mr. F. E. Behm, General Plant Superintendent of the Lincoln Telephone & Telegraph Company, Mr. Stuart M. Johnson, Plant Engineer, General Telephone Company, Madison, Wisconsin and Mr. J. B. Haley of the Illinois Telephone Company. We believe that these plant conferences are of special benefit and that more time should be devoted to them.

Mr. F. M. Strasser of the Lincoln Telephone & Telegraph Company was busy checking over new developments and greeting his many friends.

On October 18th a most interesting address was given by Mr. W. S. Devereaux of the Chicago Office of the Federal Bureau of Investigation. This talk was of special interest to the writer because the last time I saw this young man he wore short trousers and visited our exchange with his father, Mr. A. W. Devereaux who happened to be Plant Chief of the District in which I then worked.

Major John C. Grable of the Office of the Chief Signal Officer, War Department, Washington, D. C., also gave an interesting address on the telephone service of the Army in this limited emergency and how the service would be expanded in the event of actual war. This address was of special interest to Independent Telephone people as few had any definite ideas as to just how this large and difficult communication problem would be handled.

FRANK DAVIES, General Telephone Directory Publishing Co., man made a hit with his Convention Telephone Directory which was published each day during the convention. The printing job, under the direction of John Wass of R. R. Donnelley & Sons Co., was done at night at the company's plant a few miles south of the Stevens Hotel.

The Raytheon Manufacturing Company was ably represented by Mr. Ezra Stevens and Mr. R. B. Ritter. Ezra flew in from Washington, D. C. on a Strato liner and he tells us confidentially that until you have seen clouds and moon light with a pretty hostess from an altitude of 19,000 feet that you just haven't seen anything.

Highlights of the Communication News

(Continued from page 21)

and year's contract its TWX operations did not cover expenses.

•

Wage-Hour

The Wage and Hour Division received judicial sanction from the United States Supreme Court Oct. 28 for its right to subpoena payroll records, when the highest tribunal refused to review the appeal of the Montgomery Ward Co

An Independent telephone company, the Consolidated Telephone Co. of Moultrie, Georgia, recently was ordered by the Federal district court to comply with the wage-hour law and to pay back minimum wages to 28 employees amounting to $2,725.68.

•

Oppose Toll Rate Decision

The Pacific Telephone and Telegraph Co., will present oral argument to the entire FCC Nov. 14 opposing the Commission's proposed report which held that its interstate toll rates should be brought down to the level of the A. T. & T. Long Lines charges. The proposed report was based on FCC investigations and hearings on the Pacific Coast into the Pacific Company's interstate rates and constituted the first formal rate inquiry of the Communications Commission.

•

Commissioners Convention

The National Association of Railroad and Utilities Commissioners will hold its annual convention December 10-12 in Miami, Florida. Three main topics regarding telephone regulation are listed on the program. One of these is the opportunity for cooperation between state and Federal commissions; another, the public interest in the unification of interstate and intrastate toll rates; the other, problems in apportionment of property, revenue and expense between exchange and toll business. At the convention it is expected that Chief Accountant Fred G. Kleinman of the Illinois Commerce Commission will make the recommendations of the Association's committee on Accounts and Statistics, of which he is Chairman, regarding the re-classification of telephone companies for accounting and reporting purposes, according to their sizes.

Labor Contract

The American Telephone and Telegraph Co., Oct. 23 entered its first collective bargaining agreement with a labor union, the Federation of Long Lines Telephone Workers, an independent organization affiliated with the National Federation of Telephone Workers. The labor agreement which covers 10,000 A. T. & T. Long Lines employees in 11 cities, nearly half of them in New York, is featured by a wage study to be made by the U. S. Department of Labor and a plan for arbitration. Negotiations had been in progress for nearly a year. Under the agreement, wage increases totaling $300,000 annually were granted but final adjustment of pay schedules was deferred pending the study by the Labor Department. This Labor Department wage study was regarded as a "trail blazer" for industries in collective bargaining where the members and union are unable to agree on pay questions.

•

A.T. & T. Experts Who Started Transoceanic Telephony Observe Quarter Century

The quarter century of interoceanic radiotelephone service was commemorated Oct. 21 by a group of 15 A. T. & T. and Bell Laboratories officials who conducted the operations in the first radio spanning of the Atlantic Ocean by the human voice on Oct. 21, 1914. The highlight of the anniversary observance was a New York-Honolulu conversation between Dr. Frank B. Jewett, Vice President of the A. T. & T. Co., and Chairman of the Board of the Bell Telephone Laboratories and A. A. Scott, President of the Mutual Telephone Co. of Hawaii. The first radiotelephone tests which were successful were those between the Eiffel Tower in Paris and the U. S. Navy radio station at Arlington, Va. The A. T. & T. officials who conducted the experiments in October, 1915, operated both the Paris and the Arlington radio stations, while Bell System observers received the radio transmissions at Navy radio stations at San Francisco, Panama, Honolulu, New York and San Diego.

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PROTECTED CABLE TERMINALS

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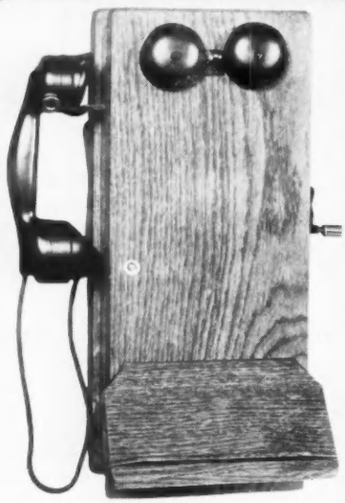

This Handset Wall Telephone

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plus your old magneto set

Try to top this value anywhere! A rebuilt and modernized "compact" type magneto telephone, newly equipped with Monophone handset and anti-sidetone circuit—Only $11.75.

This instrument carries the AR tag — your guarantee of superlative workmanship and long life. Autelco rebuilding service is one of the most popular of the Automatic Electric services for independent companies. For full information, send for circular 1640-A.

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"Foreign Exchange" a New Type of Service

There was recently established in the Los Angeles, California, metropolitan area, a central office operating unit which it is believed is unique in telephone operations. Associated Telephone Company, Ltd., placed in operation on the evening of September 21, 1940 a service unit with the prefix "Brighton", which, while owned and operated by the Associated Company is nevertheless in reality a unit of the Beverly Hills exchange of the Southern California Telephone Company and provides Beverly Hills service to telephone subscribers in the West Los Angeles exchange area on a "foreign exchange" basis. "Crestview" is the prefix of the subscribers regularly served by the Beverly Hills exchange.

Earlier in the year Beverly Hills extended foreign exchange service was made available to West Los Angeles subscribers. Until the installation of the "Brighton" unit, service was provided over lines extending from the Beverly Hills office of the Southern Telephone Company. Subscribers to this service were assigned the same prefix to their telephone numbers as were regular Beverly Hills subscribers.

The demand among West Los Angeles residents for the new service soon resulted in the necessity for providing additional cable facilities from "Crestview" into the area. The effect of the "Brighton" unit has been to reduce the number of cable pairs required to furnish Beverly Hills service in the West Los Angeles area by approximately two-thirds. Central office equipment was provided in the West Los Angeles office for terminating subscriber lines and trunks were provided to permit calling between the new unit and the Southern California Telephone Company offices to which Beverly Hills extended subscribers have calling privileges without additional charge under exchange service schedules. The initial installation was for four hundred lines with five hundred connector terminals, serving over eight hundred stations. Telephone numbers of Beverly Hills extended foreign exchange subscribers in West Los Angeles were changed, and the prefix "Brighton" assigned.

A unit of central office equipment such as this, located in a central office of one exchange and furnishing to subscribers in the local area the same service offered subscribers in another adjacent exchange area is not new. The Southern California Telephone Company has several such foreign exchange units which provide Los Angeles exchange service to subscribers living in contiguous exchange areas. The "Brighton" unit is the first one installed in California in connection with exchange service other than Los Angeles and is unique because it is the first foreign exchange unit which offers to subscribers living in an area served by an independent company the same service given subscribers of a Bell Company exchange.

Iowa Telephone Man To Illinois

Mr. A. L. Myers, formerly manager of the Jefferson Telephone Company of Jefferson, Iowa, has accepted a position and is now employed as plant superintendent for the National Trail Telephone Company of Altamont, Illinois. This company serves Altamont, Beecher City, Brownstown, and St. Elmo, Illinois, and the neighboring territory.

Mr. Myers will have charge of the outside plant and all office equipment for the National Trail Telephone Company.

Don't Shout

Speak Softly

•

Get Your Messages Across quickly with

DUO-VOX

2-Way Loud-Speaking Telephones

•

Supply your subscribers now.

REMEMBER! THESE CUSTOMERS WILL BUY. WILL YOU SELL THEM!

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Leland Wright Selected

Leland Wright

Selection of Leland Wright, secretary-treasurer of the Alexandria Telephone Company, Alexandria, Minn., as a member of the Board of Directors of the U. S. Independent Telephone Association was announced at the recent convention held in Chicago.

"Nubs" is well known in the industry having grown up as a telephone man. He has plenty on the ball as those who recently attended the Commercial Conference will admit. As a former president of the Minnesota Association he has earned the recognition bestowed upon him by the National Association.

It is his thought that the selection is in recognition of the work done by the Minnesota Independent telephone men as a whole. His modesty is as becoming as is his appearance in the accompanying photo taken while he was presenting trophies at the Annual Minnesota Resorters Golf Tournament held in Alexandria last Summer.

Convention Reports

THE Tennessee Independent Telephone Association held its sixth annual meeting on October 28 and 29 at the Hermitage Hotel, Nashville. Those who attended hailed it as the best meeting held since the founding of the organization in 1935.

The very popular B. P. Piepmier of Cookville, formerly secretary-treasurer was elected president for the coming year and W. G. Snapp of Bristol was elected secretary-treasurer. Other officers and directors who will serve during 1941 are as follows: D. Kelley McNish, Bristol, vice-president and director; and J. O. Neelly, College Grove, W. F. Corman of Collierville, James N. Cox, Cookville and H. A. Stoker of Gleason will be the new directors.

The opening address of the first day was made by the 1940 president, L. E. Crawley of Bruceton. Louis Pitcher, executive vice-president of the national association was the featured speaker. Mr. Pitcher also was the featured speaker at the Executives' Club in luncheon in Nashville on October 28.

Tennessee Independent telephone men at this convention discussed with great interest the problems confronting small companies. Others who spoke at the meeting were as follows: Leon Jourolmon, member of the Tennessee Railroad and Public Utility Commission; Miss Hattie Walker of McMinnville; W. J. Holladay, Cookville; W. G. Snapp of Bristol; Ira L. Knight, Milton; Miss Leitha Harris, McMinnville and J. E. Sexton, manager of the Inter-Mountain Telephone Co. exchange at Kingsport.

Alabama Convention Record Attendance

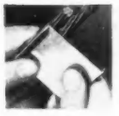
ALABAMA'S Independent telephone men, holding their annual convention at the Jefferson Hotel in Montgomery on October 31 and November 1, enjoyed the largest crowd ever to attend an Alabama convention.

James N. Cox, Jr. of the Alabama Telephone Co., Fayette, was elected president for 1941. The retiring president, G. R. McKelvey of Dothan in his welcoming address, stressed the importance of all operating companies subscribing to the telephone trade journals. He clearly brought out that in these magazines will be found the latest telephone news, as well as all kinds of national and state legislative acts which may effect the telephone companies; plus information on developments of latest equipment.

He also emphasized that the program of the rural telephone development and the maintenance of service to the small rural isolated areas was a definite problem to the industry, but that we must attempt to cooperate with the government in national preparedness if we

You Can Serve-Up Strand Ends Neatly, Quickly and Safely with

KEARNEY STRAND BANDS



Note position of band edge before bending

Straight edge is inserted into reverse bend

Crimp the seams tightly with pliers

Flatten straight edge back on itself

SERVE-UP STRAND ENDS quickly, neatly and more safely—with Kearney Strand Bands....Eliminate risks of injury — so often caused by old methods of serving-up strand ends with stiff, hard-to-handle guy wire.... Gain neater appearance and more workmanlike jobs ... avoid frayed strand-ends by serving-up with inexpensive Kearney Strand Bands. Don't miss this opportunity to try them at our expense.

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TELEPHONE ACCESSORIES

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electrical
Wire & Cable

Paper Insulated and Leaded Telephone Cable... 150 Pairs

Telephone Cable... Paper Insulated and Leaded.

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Telephone Switchboard Cable ... Silk and Cotton Insulated and Leaded.

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Twisted Pair and Parallel Telephone Wire... Rubber Insulated and Braided (bronze, copper, iron, and Copperweld).

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Bare Copper and Bronze Wire.

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Bare Galvanized Steel Wire.

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Galvanized Steel Strand.

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TRENTON, N.J.
Branches in other cities

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

expect them to stay out of our business in case this country becomes involved in war. Mr. McKelvey also encouraged operators to make their purchases at once, due to the increase in prices going into effect on the first of the month.

New officers and directors elected for 1941 were as follows: President, Mr. Cox, Jr.; secretary and treasurer, Fox Henderson, Standard Tel. and Tel. Co., Dothan; Vice Presidents—G. A. Crenshaw, Greenville Telephone Exchange; Greenville; B. H. Stallworth, Monroeville Telephone Co., Monroeville; H. W. Vaughan, Alabama Telephone Co., Fayette; and Wasson Harmon, St. Clair County Telephone Co., Pell City. Directors— G. R. McKelvey, Dothan; Jas. N. Cox, Sr., Fayette; F. W. Kuhn, Troy; W. H. Vaughan, Florala; J. M. Dean, Union Springs; P. G. Mathis, Elba; Lonnie Cowan, Opp; R. C. Corr, Oneonta; and E. E. Survant, Foley.

The Alabama convention was addressed by the following persons:

Louis Pitcher, executive vice-president of the USITA; Charles A. Stair, vice-president of the Southern Bell Telephone Co.; Hon. Hugh White, president of the Public Service Commission of Montgomery and W. A. Steadman, Alabama manager of Southern Bell Telephone and Telegraph Co.

James N. Cox, Jr., retiring secretary and treasurer reported the association was in satisfactory financial condition and had lived within its means during the past year. Ten new members joined the association during 1940, he said.

Ohio Fall Meetings

One hundred telephone men from central and southern Ohio met October 30 at Chillicothe for the second fall meeting of the Ohio Independent Telephone Association and on November 4 another group met for the third and last fall meeting at Marion.

David McKell and Harry Elliott of the local telephone company at Chillicothe played host to persons attending the first meeting and J. T. Carliss, Marion, was host for the November 4 meeting.

Semi-annual reports on the activities of the association were given by President J. W. Safford, Troy and Frank L. McKinney, Columbus, secretary-treasurer.

IT&T Reports 67,515 Station Increase for Nine Months

The report of telephone operating subsidiaries of the International Telephone and Telegraph Corporation for the first nine months of 1940 includes statistics on the National Telephone Company of Spain for the first time since July, 1936. It shows I. T. & T. telephone companies operating 1,177,546 telephones in ten foreign countries as of September 30 this year which is the largest number these companies have ever had in service. The aggregate net increase for the nine months period is 67,515 telephones. Companies in Latin America contributed 28,313 to this increase and the Spanish Telephone Company has added 28,360 telephones since the first of the year to bring Spain's total number of telephones in service to 319,632.

Commercial radiotelephone service between the United States and Spain was opened by the American Telephone and Telegraph Company and the Spanish Telephone Company on Tuesday.

I Wanted to See at the National Convention, But Didn't

By
QUIZZICUS

The new cable spinning machine and a demonstration as to how it may be used to lash cable to a messenger.

Equipment demonstrated as to how the gas pressure test can be made on cable.

New type of steel rod duct rodding outfits and how they may be used to advantage.

The Gas operated hammer drill which can be used in lieu of compressors and air hammers.

Dehumidification and air conditioning equipment for use in telephone exchanges.

Electric hammer drills of the type required in telephone work.

Material which can be used for acoustical treatment of the Ceiling in Telephone exchanges.

A. J. Adams, Chariton, Iowa, Champion Guesser at Convention

Guessing at the number of Con-Nec-Tites in five fish bowls in the James R. Kearney Corporation's exhibit at the National Convention, Mr. A. J. Adams of the Lucas County Telephone Company of Chariton, Iowa, walked-off with first prize with the amazing guess of 1582. The actual count was 1580. D. M. Godfrey of the Northern Ohio Telephone Company, Bellevue, Ohio, was second with a guess of 1640 and Mr. Henry S. Dabdoub of Mexico City was third with 1659. Mr. W. F. Corman of Collierville Telephone Company, Collierville, Tennessee, and Mr. C. H. Reese of Chicago tied for fourth place with guesses of 1670. 758 people made guesses, some of whom failed to sign their names to their guesses and one of them is going to be surprised as he would have won the second prize.

25 YEARS AGO THIS MONTH

Taken from TELEPHONE ENGINEER files of NOVEMBER, 1915

The most startling news to come before the Independents, exactly twenty-five years ago today, was the announcement of a joint convention held by the two national independent associations. The officers of the Independent Telephone Association of America and the National Independent Telephone Association were preparing the Independents for the change that came in December of the same year when they joined together to form the present United States Independent Telephone Association.

▼

The Western Electric Company, with a force of American experts, installed 2,926 telephone instruments in Ecuador, of which 2,250 were in Guayaquil, requiring 2,539 miles of wire. With the completed installation Guayaquil enjoyed a telephone service equal to that in the large cities of the United States.

▼

The latest and most wonderful triumph of telephonic science came in the announcement of wireless telephone communications at a distance of 4,000 miles. Previously, distances claimed for wireless telephony varied from a few to several hundred miles. Mr. J. J. Carty, then president of the American Institute of Electrical Engineers, opened the transcontinental line that gave the world this marvelous power to talk across vast spaces.

▼

A chorus of nearly 5,000 employees of the New England Telephone and Telegraph Company in Mechanics Hall, Boston, Mass., sang "America" to an audience of several thousand employees of the Pacific Telephone and Telegraph Company at the San Francisco exposition. As soon as the applause 3,000 miles away on the Pacific coast subsided, the Californians responded with "The Star-Spangled Banner" and in turn were cheered.

▼

The latest New York City telephone directory contained 350,000 listings for 566,000 telephones in the city. It had, in 1915, 970 pages and 610,000 copies were distributed.

▼

At the annual meeting of the Association of Railway Electrical Engineers in Chicago, Dr. F. H. Milliner, experimental engineer of the Union Pacific Railway spoke hopefully of communicating with persons on fast trains by wireless telephone and telegraph.

NLRB Reports on Lincoln, Neb. Complaint

A 14-page report of Henry J. Kent, trial examiner assigned by the National Labor Relations Board to hear a complaint against the Lincoln (Nebr.) Tel. & Tel. Co. last April, recommends that the board order the company to withdraw recognition of the Federation of Telephone Employees. The original charge was filed by a local of the Electrical Workers' Union. Very few of the employees are affiliated with the latter.

Woods, Aitken & Aitken, attorneys are now reported to be preparing objections to the findings to request a hearing before the NLRB. The report charges that certain employees, active in the formation of what the complainants claim was a company union, as being supervisory employees, and that their solicitation of members constitute a violation of the Labor Relations Act.

The complaint was made a full year before the hearing last April and the examiners report comes six months after the hearing. The Federation of Telephone Employees has members in both Independent and Bell operated companies.

It will be recalled that during the hearing a statement was made to the examiner by John H. Agee, general manager of the company, in which was recited the benefits all workers get regardless of union membership, indicating why the workers preferred membership in the federation. These include vacation pay, pay when death occurs in the family, full pay when injured regardless of $15 limit of workmen's compensation law, pension and sick benefits, group life insurance, cooperative credit association, maintenance of clubs, cafeteria where food is sold at cost, libraries and schools of instruction.

Peoples Telephone Corp. Acquires New Property

The Public Utility Commission of Pennsylvania on October 21, 1940 approved the sale of the property of the Valley Telephone Company of Emlenton to The Peoples Telephone Corporation for the sum of $39,000.00.

The Valley Telephone Company operates an exchange at Emlenton, and serves 365 telephones. The Valley Company also owns toll lines which connect with the Peoples Company at Butler and Eau Claire, with the Pennsylvania Telephone Corporation at Oil City and Clintonville, and with the Rural Telephone Company at Knox.

The Peoples Company proposes to rehabilitate the Valley property and to extend exchange service from Emlen-

When you buy HOISTS check the extra features of . . .

The CHANCE PULLEY BLOCK and the TIPS TUGGER

The Capstan Pulley Block is light weight, easy to operate, and has a leverage ratio of 32 to 1. It is easily carried up poles, trees, ladders, etc. Has ratchet handle operation. Write for complete details.

The Tips tugger is a spur geared puller with ratchet handle, friction brake, and "free wheeling." It will pull at any angle without binding the chain. 43 pounds on the lever will lift ¾ ton. Working parts are fully enclosed and packed in grease. Write or ask your jobber for more information.

ABC INDUSTRIES

A·B·CHANCE CO. CENTRALIA MISSOURI

A Sound Investment...

THOUSANDS of Suttle "Tablephones" are now in service, doing a splendid job day in and day out, to the entire satisfaction of subscribers and telephone men who installed them.

The beautiful natural finish cabinet adds a grace to the telephone that makes it an asset to the decoration of any fine home.

Transmission qualities are clear and efficient. The whole instrument is sturdily built, and dependable manufacturing methods give it a certainty of performance that makes it a favorite with telephone men.

Try installing this most popular telephone. It's a wise move.

See Suttle Catalog for details.

Suttle Equipment Co.

Lawrenceville, Illinois

ton to include Foxburg and Eau Claire. Two additional toll lines to Butler are also to be provided.

It is proposed to install dial type equipment some time late in 1942.

The Public Utility Commission of the Commonwealth of Pennsylvania on October 21, 1940, approved the sale of $700,000.00 of First Mortgage Bonds of The Peoples Telephone Corporation to the Provident Mutual Life Insurance Company of Philadelphia.

These bonds are dated July 1, 1940 and mature in twenty-five years. They bear interest at the rate of 3¼% per annum.

The bonds are secured by an open end mortgage on the fixed property of the corporation.

The proceeds of this bond sale will be used to retire $600,000.00 of 4% First Mortgage Bonds due 1960, as of December 1, 1940, at a premium of 2½% and accrued interest, to purchase and rehabilitate the property of the Valley Telephone Company and to reimburse the corporation's treasury for company funds already invested in fixed property.

Get Rid of Noise!
with the Improved
VINCENT RARE GAS RELAY

Installed in a Minute
No Moving Parts
Thousands in Service
Fully Guaranteed

Eliminates unbalance noises in metallic party lines employing divided ringing to ground. Works with either harmonic or code ringing.

Write for Catalog 39-A describing
Non-Grounding Rare Gas Arresters
Terminal Strips Potheads Housings

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.
Signal Circuit Engineers Since 1906

Phones Invaluable in London Defense

One of the major mediums of the success of the British in combating the German airplane invasion attempts is communications and a recent "New York Times" story told how the British leader in blocking the Nazi air raids—"Stuffy" Dowding (Air Chief Marshall, Sir Hugh Dowding)—uses telephone and radio. The Times story stated that the Air Chief Marshall "by a vast complicated telephone system" knows the position of every German bomber over England and uses the telephone to direct the defense. He also, from his headquarters, instructs the R.A.F. fighter pilots by radio.

Many tales of heroism have come from London during the air raids. One recent press dispatch told about four telephone operators with the Auxiliary Fire Service who were blown out of their chairs three times one night by explosions close by. Every time they got up and went back to their switchboards which remained unharmed and operated.

Siemens Berlin Plant Bombed

One of the large European communications manufacturing companies, the Siemens concern of Germany has had its Berlin plant hit by the bombs of the R.A.F. invading airplanes. The German claims are that little damage has occurred but the British pilots reported viewing huge fires as a result of their raids.

At the same time the Nazis have disclosed that the Jews in Berlin were no longer allowed to have telephones, except for Jewish hospitals, doctors and welfare organizations.

... yes even the "BIGGEST" EXECUTIVES! are interested!

EXECUTIVES who are "Big" in the fullest sense are constantly on the lookout for products that can be adopted to advantage.

Their desks are a clearing house for blue prints, models, gadgets and tools—up-to-the-minute ideas and devices that keep business vitalized.

It is not uncommon for men of this type—through their Purchasing Agents—to seek information on Vacuum Grip Pliers. They want to satisfy their own minds regarding our claims that Vacuum Grip Pliers represent a "Speed up" in production and a "Cut-down" in tool costs.

It will pay YOU, in the interests of administrative economy, to ascertain the full facts in connection with these super tools.

Instruct your Purchasing Agent to drop us a line for interesting details.

The Vacuum Grip Line covers every field of activity in which pliers are used—from the smallest patterns, employed by electricians on "delicate" work to the rugged heavy duty types that have proven such staunch friends of the Lineman.

Made by the FORGED STEEL PRODUCTS CO. Newport, Pa. —and made RIGHT!

Vacuum Grip Pliers

OVER A MILLION AND A QUARTER IN USE

Wisconsin Association Joins in Celebration of Anniversary

On October 15, 40 years ago, the State Long Distance Telephone Co., Elkhorn, Wis., was organized. Charles H. Wiswell, president and co-organizer of the company, was honored by a district convention of the Wisconsin Locally Owned Telephone Group at Elkhorn on October 15 of this year and celebrated the 40th Anniversary with many Wisconsin telephone men.

At a banquet following an afternoon program, those attending were privileged to hear an address by Ruth Bryan Rhode, former U. S. Minister to Denmark, and daughter of the former statesman William Jennings Bryan.

Heard in the afternoon session were: Baxter Milne, general attorney for the Wisconsin Telephone Co.; Paul Thiel, bureau of internal revenue, and Robert Nixon, member of the Wisconsin Public Service Commission. Heard during the evening was an address by Mayor Thorson of Elkhorn who eulogized the service of Mr. Wiswell and his company to the city and the nation. After a short talk given by Thomas Sanderson, vice president of the company, C. A. Jahr, superintendent of Elkhorn schools, presented Mr. Wiswell with a watch as a token of appreciation of his service to the community and the company.

Texas Convention Date

Announcement has just been made that the Texas Telephone Association will hold its annual convention at the Texas Hotel in Fort Worth on March 19, 20, and 21. The selection of the site was made by ballot. San Antonio was the host to the convention last February when a new high in attendance was recorded.

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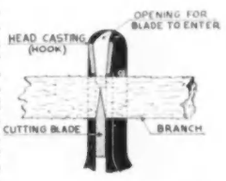
THE MAN WHO USES 'EM
SEYMOUR SMITH
TELEPHONE PRUNERS

The man in the field—the operator whose job it is to clear and prune under all conditions, in all weather—generally is the first to acclaim the efficient, clean cutting features of Seymour Smith Pruners.



"Center-Cut" Construction

All Seymour Smith Telephone Pruners are distinguished by "Center-Cut" construction principle. A thin, keen cutting blade slices between two strong side supports. Thus the branch is securely gripped between blade and hook and cutting is made positive, clean and fast.

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CLEARING TOOLS

Seymour Smith produces a complete line of trimming, pruning and clearing tools for every type of utility work.

- TREE and TELEPHONE PRUNERS
- POLE and HAND SAWS
- LONG HANDLED PRUNERS and BRUSH CUTTERS
- JOINTED TEST PIKE POLES
- CABLE CUTTERS
- RANGING RODS

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TO insure the continuance of its unbroken record of prompt service to the independent telephone industry, Cook Electric Company announces a new addition to its plant.

The new building which will serve as a warehouse and shipping point is joined to the main Cook plant by an overpass. Thus, the increased demands being made upon Cook facilities can be efficiently handled and service carried on without interruption or delay by the maintenance of adequate stocks.

When you buy Cook equipment you know you are completely protected on quality and prompt, efficient service.

COOK ELECTRIC COMPANY
2700 SOUTHPORT AVENUE, CHICAGO

KEEP UP-TO-DATE

"Behind the times" style of writing letters does not lead your customers to think your business equipment or methods are UP-TO-DATE.

How To Write BETTER BUSINESS LETTERS
By
L. E. FRAILEY, B.A.

Lecturer and Business Letter Counselor, Editorial Director, The Dartnell Corporation Sales Consultant Evening Division, School of Commerce, Northwestern University.

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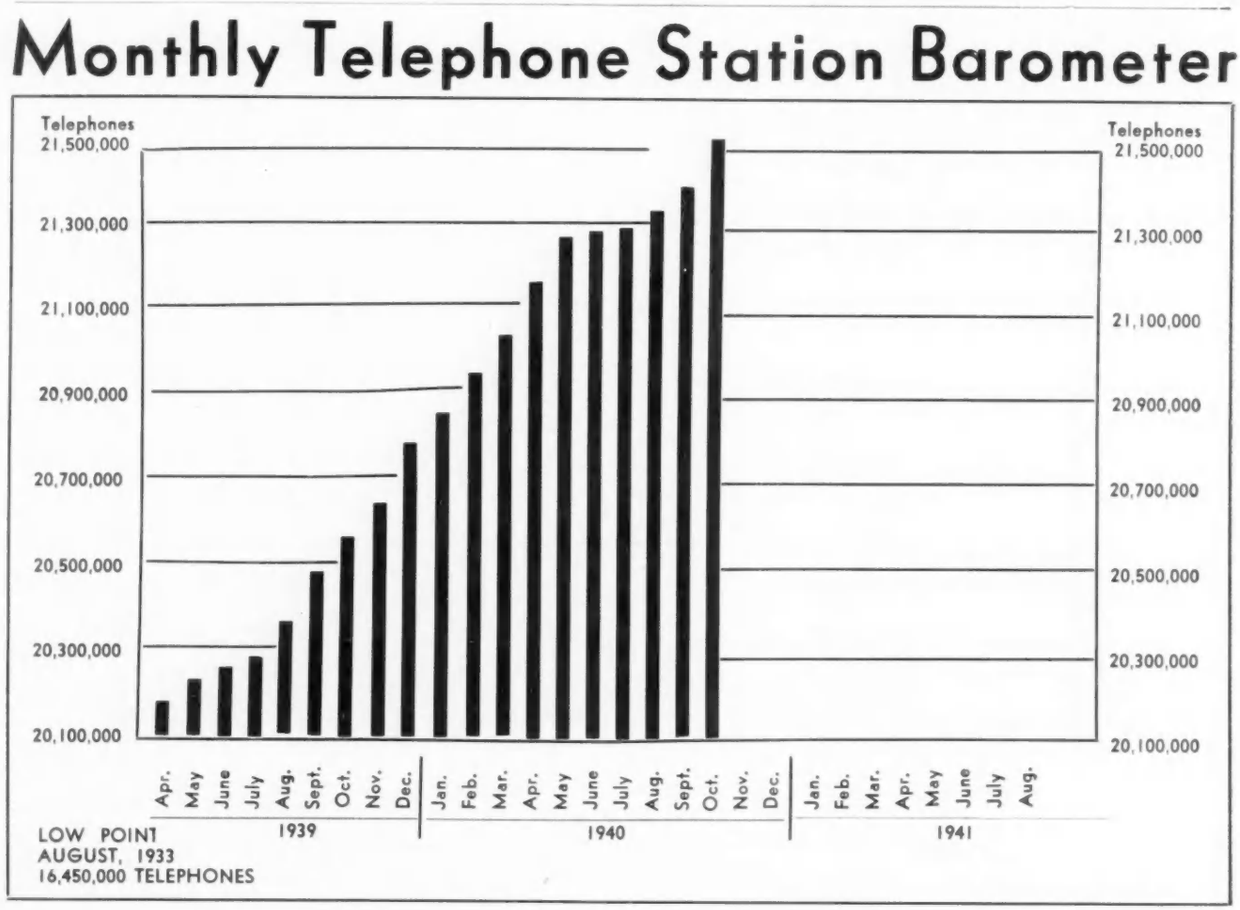
TELEPHONE ENGINEER
7720 SHERIDAN ROAD CHICAGO

Monthly Telephone Station Barometer



Census Report Shows Equipment Sales Heavy

THE total value of telephone and telegraph apparatus, not including wireless, produced in the communication equipment industry in 1939 was $94,337,945, according to a preliminary report entitled "Communication Equipment" just issued by the Bureau of the Census and based upon returns in the 1939 Census of Manufacturers. For 1937, the period covered by the last previous Census of Manufactures the value of telephone and telegraph apparatus, as reported for that year's production, was $115,882,648.

The number of establishments in the communication equipment industry covered in the 1939 report was 227, an increase of 21.4 per cent from the 1937 total of 187 establishments.

The value of all products of the communication equipment industry for 1939 amounted to $191,326,489, a decrease of 15.9 per cent compared with $227,523,931 reported for 1937. Because they account for a negligible portion of the national output, plants with annual production value of less than $5,000 have been excluded from the Census of Manufacturers since 1919.

The value of radio apparatus manufactured in the industry last year was approximately $51,500,000 and included miscellaneous parts, $45,665,666; radio transformers for receiving sets, $5,211,747; and transformers for transmitting sets, $607,783. This covered 6,767,722 transformer units for receiving sets valued at $3,279,936, while the number of transformers represented in the remainder of the overall production valuation figure was not reported.

A third section of the report is devoted to electric signalling apparatus, other than railway and lists 1939 pro-

PRODUCTS, BY CLASS, NUMBER, AND VALUE: 1939 and 1937

	1939	1937
1. Communication Equipment industry, all products total value	$191,326,489	$227,523,931
2. Communication equipment made in the industry	150,862,615	167,560,396
3. Miscellaneous products not specified	4,016,460	14,856,630
4. Receipts for contract and repair work	347,660	91,029
5. Other products (not classified in this industry)	[1] 36,099,754	45,015,876
6. Communication equipment made as secondary products in other industries	[2] 14,543,233	26,050,800
Communication equipment, aggregate value (sum of 2 and 6)	$165,405,848	$193,611,196
Radio apparatus:		
Miscellaneous parts	$45,665,666	$47,328,415
Radio transformers—		
Number reported—		
Number	6,767,722	8,859,645
Value	$3,279,936	$4,479,608
Number not reported, value	$1,931,811	$3,389,605
For transmitting sets, value	$ 607,783	$ 487,630
Signaling apparatus, electric (other than railway)		
Audible signals	$4,252,460	$3,162,475
Burglar-alarm and hold-up apparatus	$ 833,822	$1,007,687
Contact devices	$ 284,930	$239,887
Electric street traffic-signal apparatus and accessories	$1,265,595	$1,243,950
Fire and watch signal apparatus	$881,647	$495,954
Hospital signaling apparatus	$757,071	$452,920
Nonautomatic internal telephone apparatus	$395,434	$383,812
Relays	$238,211	$288,112
Visible signals	$416,500	$420,701
Municipal fire and police signaling systems, including sprinkler supervisory and automatic fire-detecting devices	$1,010,865	(3)
Railroad highway grade crossing signals (exclusive of relays and other control apparatus)	$1,454,244	(3)
Other[4]	$7,791,928	$14,347,792
Telephone and telegraph apparatus (not including wireless)	$94,337,945	$115,882,648

[1] Ignition apparatus, insulated wire, telephone and telegraph cable, laboratory testing instruments, resistance welding electrodes, transformers.

[2] Incomplete; complete figures will be given in the final report.

[3] Included in "Other" electrical signaling apparatus in 1937.

[4] Includes laboratory electrical test equipment, and railway signals and attachments (including automatic train controls), and visual and audible code-calling systems for 1939 and 1937. See also items covered by footnote 3.

On your lines this L-M Steel House Bracket will give you a typical example of the long service life you can expect of all L-M Telephone Construction specialties. Its fine, high-strength steel body is thoroughly galvanized. Its glazed porcelain insulators meet the industry's most exacting standards. Make a note now to try this L-M House Bracket... and to get the full facts on the complete line of L-M Pole Line Hardware and L-M Telephone Construction Specialties.

LINE MATERIAL CO.

REPRESENTED BY

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SANDS

TYPE 60
CABLE TERMINAL

For a permanent, workmanlike job on your next cable installation, try SANDS Type 60 terminals. Bring the cable in from top or bottom—and see how snug, how smooth, all those connections are. You'll know you've done a craftsmanlike job.

It takes good products to do a good job—and SANDS cable terminals are really good.

TYPE 60 SPECIFICATIONS

With or without 6 ft. 22 gauge cable stub. Zinc cover. Reversible. Galvanized cast iron frame and core box. Capacities: 11, 16, or 26 pair.

AUTOMATIC ELECTRIC

TELEPHONE, SIGNALING, AND COMMUNICATION APPARATUS

Distributors in U. S. and Possessions:
AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 West Van Buren Street, Chicago, U.S.A.

SUMMARY FOR THE INDUSTRY: 1939 and 1937

(Because they account for a negligible portion of the national output, plants with annual production valued at less than $5,000 have been excluded since 1919)

	1939	1937	Percent of increase or decrease (-)
Number of establishments	227	187	21.4
Salaried personnel[1]	9,305	13,470	-30.9
Salaries[1,2]	$25,325,092	$29,740,220	-14.8
Wage Earners (average for the year)[3]	32,119	40,981	-21.6
Wages[2,3]	$44,444,379	$55,326,496	-19.7
Cost of materials, supplies, fuel, purchased electric energy, and contract work[2]	$48,353,690	$65,180,565	-25.8
Value of products[2]	$191,326,489	$227,523,931	-15.9
Value added by manufacture[4]	$142,972,799	$162,343,36.	-11.9

[1] No data for employees of central administrative offices are included.

[2] Profits or losses cannot be calculated from the census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.

[3] The item for wage earners is an average of the numbers reported for the several months of the year and includes both full-time and part-time workers. The quotient obtained by dividing the amount of wages by the average number of wage earners should not, therefore, be accepted as representing the average wage received by full-time wage earners.

[4] Value of products less cost of materials, supplies, fuel, purchased electric energy, and contact work.

duction values for audible signals, burglar alarms, street traffic signal apparatus, highway grade crossing signals, fire and police signalling systems, and others.

The wage earners primarily engaged in manufacturing in this industry in 1939 numbered 32,119, a decrease of 21.6 per cent, compared with 40,981 reported for 1937, and their wages, $44,444,379, decreased 19.7 per cent as compared with $55,326,496, reported for 1937. These decreases may be partially accounted for by the fact that the 1939 Census of Manufactures questionnaire, for the first time, called for personnel employed in distribution, construction, etc., separately from manufacturing employees of the plants. It is not known how many of the wage earners reported for 1937 were engaged in distribution and construction and how many were engaged in manufacturing. Employees of the plants reported as engaged in distribution and construction activities in 1939 are not included in this preliminary report but will be included in the final report.

This industry, as constituted for census purposes, embraces establishments primarily engaged in the manufacture of electric signalling apparatus (other than railway); signals and attachments (railway); telephone and telegraph equipment; and miscellaneous radio parts except loud speakers and microphones which are a part of the Radios, Radio Tubes, and Phonographs industry.

We reproduce the report herewith:

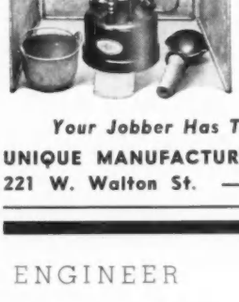
MANUFACTURERS of communication equipment reported moderate decreases in employment, wages, and production for 1939 as compared with 1937, according to preliminary figures compiled from returns of the Census of Manufactures for 1939 and released today by Director William Lane Austin, Bureau of the Census, Department of Commerce.

The value of products of the industry for 1939 amounted to $191,326,489, a decrease of 15.9 per cent, compared with $227,523,931 reported for 1937.

SPLICER'S TOOLS

Of Top Quality by **UNIQUE**

- FURNACES
- SOLDER POTS
- BLOW TORCHES
- WIPING CLOTHS
- BALANCED LADLES
- SOLDER IRON HANDLES
- POLE BLEEDING TORCHES
- FOLDING SAFETY SHIELDS



Protect Public, Splicer, and Furnace. No. 50 C Shield shown here. Of 22 Ga. galvanized steel. Reinforced edges. 23"x17" x17". No. 50 — four-sided with grate. No. 50 A — same without grate.

Your Jobber Has These Tools

UNIQUE MANUFACTURING CO., INC.
221 W. Walton St. — Chicago, Ill.

To the Rescue

The Sierra Madre, Calif., telephone company has entered the humanitarian field. It was called upon by the police to rescue a cat which had been driven up a telephone pole by an irate bird and was sitting perilously on the wires. The telephone company responded.

General Corp. Has Gain

General Telephone Corporation reports for its subsidiaries a gain of 2,424 company-owned telephones for the month of October, 1940 as compared with a gain of 1,616 telephones for the month of October, 1939. The gain for the first ten months of 1940 totals 24,116 (exclusive of purchase or sales) or 4.79% as compared with a gain of 19,914 telephones or 4.33% for the corresponding period of 1939. The subsidiaries now have in operation 527,201 company-owned telephones.

Florida Independents Serve in Defense Plans

The government's tremendous preparedness program in Florida, presumably for the defense of the Panama Canal, is causing additional problems for Florida Independents. While present bases like the submarine base at Key West and the naval training school at Pensacola, and other bases now under construction such as the Southeastern Naval base at Jacksonville, its auxillary at Banana River, and a MacDill field sub-base at Orlando are served by the Southern Bell, other important military points are served by Independents.

Most prominent of these is 5500-acre MacDrill field near Tampa, which is being planned as the largest army air field in the U. S. The Peninsular Telephone company which renders service to this base from its headquarters exchange, also serves a big, government approved aviation training school at Lakeland. Proposed MacDill field sub-bases at Ocada and Fort Myers will be served respectively by the Florida Telephone Corp. and the Inter-County Tel. & Tel. Company. Camp Blanding, where some 60,000 national guardsmen are to be trained, is located in the territory of the Winter Park telephone company.

In writing advertisers please mention that you read it in TELEPHONE ENGINEER. THANKS!

Put These Money-Savers On All Your Lines

HEMINGRAYS don't tax your operating budget. They actually save money because they outlive poles, hardware and crossarms; "keep up their money-saving efforts for 50 years"— one prominent utility reports.

85-YEAR OLD secret glass "batch-mix," plus Owens-Illinois quality-controlled production, results in Hemingrays free of voids, stresses and strains... so homogeneous that sudden changes of temperature leave them unimpaired to work perfectly through sun, rain, hail, snow and sleet.

LOW IN COST and long in service-life... sold only by principal jobbers.

3 Favorites On Rural Lines

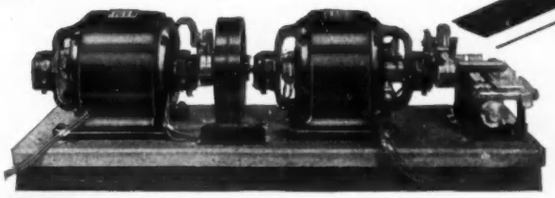
Hemingray Number 42, with its long leakage path keeping "toll" lines trouble free. Number 9, with its fast moisture run-off petticoat and sturdy, all-purpose Hemingray Number 16. Get samples.

OWENS-ILLINOIS

HEMINGRAY Telephone & Telegraph Insulators · LOWEX Power Insulators

Export Agents: International Standard Electric Corp., New York

Important!



HOLTZER-CABOT

- **RINGING MOTOR GENERATOR SET**
- It is of vital importance that a telephone exchange operate dependably without interruption. AT ALL TIMES.
- This is why Holtzer-Cabot ringing motor generators are designed and built to give a lifetime of continuous and dependable service.
- Holtzer-Cabot ringing motor generator equipment has the unqualified approval of the engineering and service departments of all major telephone companies.
- Our engineers will gladly confer with you. Their experience can be helpful — write for Bulletin 1310-02

THE HOLTZER-CABOT ELECTRIC CO.

125 Amory St. BOSTON, MASS. — *Motor Specialists* — 6161 N. State St. CHICAGO, ILL.

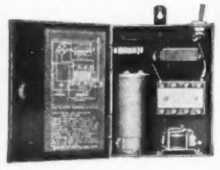
The Clearing House

For the convenience of readers of Telephone Engineer

Battery Eliminators

THE NEW ELECTROX

Battery Eliminator Type PA-05004

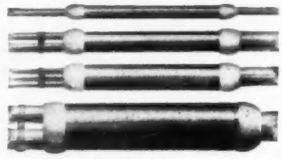


$16.85

Complete with power-off relay. Output for two operators' sets. Mount; connect two leads to operator's terminal; plug in cord. Presto! no more battery problem! Sent on trial. Write for Cir. 373.

ELECTROX 2060-68 Reading Road
A Schauer Product CINCINNATI, OHIO

Wipe Joints



How to—

Wipe Perfect Joints

on lead-sheathed cable splices.
A post card for free instructions

GEO. E. WILLIAMS, Mfr.
811 W. Lake St. Minneapolis, Minn.

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LOOMIS ADVERTISING CO.

A SALES ORGANIZATION *exclusively..*

That Has Never Failed to Produce More Net Revenue (All Costs Considered) for Telephone Companies Served.

IF INTERESTED in more net telephone directory revenue write or call at our expense.

LOOMIS ADVERTISING CO.
Telephone Bldg.,
Kansas City, Mo.

Citizens Trust Bldg., Fort Wayne, Ind.
135 So. Second St., Philadelphia, Pa.

WANTED: Manufacturer in mid-west wants men acquainted with automatic telephone equipment and circuits to engineer new automatic offices. Work would involve equipment engineering and specification writing.

In answering, state age, education, and experience — employer, your duties, years on work. All information will be held strictly confidential. Box 8255, TELEPHONE ENGINEER.

Statement of the Ownership, Management, Circulation, Etc., Required by the Act of Congress of March 3, 1933,

of Telephone Engineer, published monthly at Pontiac, Illinois, for October 1, 1940.

State of Illinois, County of Cook, ss.— Before me, a notary public in and for the State and county aforesaid, personally appeared J. A. Smith, who, having been duly sworn according to law, deposes and says that he is the business manager of the Telephone Engineer, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc, of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—Telephone Engineer Publishing Corp., Chicago, Illinois.

Editor—Ray W. Smith, Chicago, Illinois.

Business Manager—J. A. Smith, Chicago, Illinois.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address as well as those of each individual member must be given.)

Telephone Engineer Publishing Corp., Chicago, Illinois.

J. A. Smith, Chicago, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent or more of total amount of bonds, mortgages or other securities are: (If there are none, so state.)

J. A. Smith, Chicago, Illinois.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

J. A. SMITH,
Business Manager.

Sworn to and subscribed before me this 7th day of October, 1940.

(My commission expires August 4, 1944)
(Seal) H. W. SUREY,
Notary Public.

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Telephone Directory ADVERTISING

Write or telephone for proposition

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Call L.D, 16, Telephone Bldg., Dayton, O.

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Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization and Operation of Telephone Companies
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CEDAR POLES

Plain or Butt Treated
B. J. CARNEY & CO.
100 No. 7th St. Minneapolis

Finished Cedar Poles
VALENTINE CLARK CORPORATION
St. Paul, Minn.

FOR SALE — Telephone exchange at a bargain. 175 stations and three toll lines in good condition.

J. E. Russell
Cayuga, Ind.

The Clearing House

For the convenience of readers of Telephone Engineer

Reconstructed Equipment

North Elec. ALL RELAY AUTO. Swbd. Fully equipped with 60 lines and 6 links complete with Dry Disk Charger, Meters and straight line ringing machine. Operates off 48 volt Batt. Ckt. less Batts. Price on application.

Auto. Elec. No. 426 Desk stand complete with No. 24 Dial and either Molded Plastic or No. 500 Enclosed gong steel signal set equipped with Anti Side Tone 3 winding Ind. Coil and Straight line ringer $12.00

Auto. Elec. No. 21 D. C. Desk stand with dial complete with Kellogg No. 75 or 404 Steel Signal set 8.00

Auto. Elec. Type No. 21 Steel Hotel set with Dial, Straight line enclosed Gong ringer & 3 winding Anti Side Tone Ind. Coil @ 8.50

Auto. Elec. Type No. 21 D.C. Enclosed Gong ringer Steel hotel set with Dial and Straight line ringer 7.25

Auto. Elec. Co. Bi-Polar slip type Receivers with repolished shell & new Cord @ 95c—with New Shell @ 1.10

Auto. Elec. No. 6c or L. Transmitters complete with back and new mouthpiece 1.10

Auto. Elec. or Monarch drops and jacks 100 ohm 5 per strip @ $6.50—500 ohm $7.50—10 per strip 100 ohm $12.00—500 ohm @ 16.00

REBUILT ELECTRIC EQUIPMENT CO.
1934 WEST 21st STREET
Pilsen Station
CHICAGO, ILL.

ORDER YOUR BOOKS NOW
through
TELEPHONE ENGINEER

POSITION WANTED

Executive type telephone man, ambitious and capable. Graduate engineer, with fifteen years Bell and Independent experience in supervision of large plant operation. Will consider offer where ability to produce results is required. Box 8256, TELEPHONE ENGINEER.

WANTED: Traveling sales agents. Sell Carbolineum America to stop rot on new and installed poles. A profitable side line. Write for proposition. C-A Wood Preserver Company, 6625 Delmar Blvd., St. Louis, Mo.

Cook Enlarges Plant

Cook Electric Company, 2700 Southport Avenue, Chicago, announces the acquisition of an addition to its plants located at 2729 to 2731 Janssen Avenue. The new building will be used for warehousing and shipping so that the entire present plant may be turned over to fabrication. The structure will be joined to the main building by an overpass to facilitate quick movement of finished goods to the warehouse.

According to Cook Electric Company officials, increased demands have made the new addition necessary in order that prompt service in the filling of orders from adequate stocks of finished goods can be continued as in the past.

Pole Company Expands

"The L. D. McFarland Company, engaged in the Cedar pole business at Sandpoint, Idaho; Milwaukee, Oregon, and Minneapolis, has entered the Spokane field in an expansion program.

"The company has taken over a leasehold from the Northern Pacific Railway company formerly held by the Eggers Pole and Supply Company, and has purchased the latter's pole treating plant in Spokane.

"The property covers 10 acres alongside the Trent highway in the vicinity of Havana. The treatment vat, it was estimated, will handle two cars of poles a day. The lease is for a long term."

Protection Bulletin Available

A new bulletin on "Planned Protection" is available from the Graybar Electric Company, New York, New York. This is planned to explain what help is available through them in arranging telephone plants to keep out intruders and to warn of emergencies. An interesting *check list* is included to show the reader graphically whether or not his protection is adequate.

Vest Pocket Catalog

An illustrated 60-page catalog covering jacks and jack screws has been issued recently and may be had for the asking by writing TELEPHONE ENGINEER. It fully describes the construction, application and gives specifications for over 300 sizes and types of jacks.

Telephone Repair Co.

Specialists in Repairing and Rebuilding Transmitters

Repair service for Transmitters, Receivers, Desk Stands and Wall Phones—Magneto or Common Battery.

Rebuilt Gray 3-Slot No. 23A, No. 23B Pay Stations @ $12.00

The Finest Line of
NEW OAK TELEPHONE CABINETS

for rebuilding Wall Phones and Desk Sets ever offered and at the lowest prices. We furnish Cabinets with or without new wiring, inside terminals, short transmitter arms and switch hooks. ANY QUANTITY ONE TO ONE THOUSAND

The prices we ask are less than the cost of refinishing old cabinets.

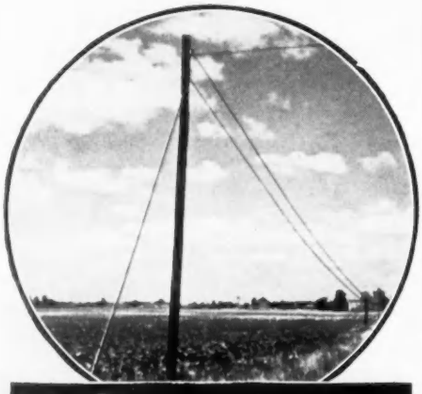
Telephone Repair Co.
Daniel H. McNulty, Manager
Rogers Park Station Chicago

RECONDITIONED WESTERN ELECTRIC TELEPHONES

No. 1533 WALL PHONES
No. 1020-AL DESK STANDS
with
No. 534 BELL BOXES
(Rebuilt and refinished)

Write for prices

Buckeye Telephone & Supply Company
COLUMBUS, OHIO



Crapo
HIGH-TENSILE
LOW-RESISTANCE
LINE WIRE

MEET RURAL DEMANDS WITH LONGER SPANS!

You now can extend rural telephone service more economically, more profitably, by building long-span lines with *Crapo* HTL-85 and *Crapo* HTL-135 High-strength Line Wire.

Marked reductions in construction costs, lower maintenance expense, improved transmission, are reported wherever these high-tensile, low-resistance line wires are in use.

Crapo HTL-85 permits spans of 225 feet in heavy loading, 325 feet in medium loading and 375 feet in light loading districts; provides stronger spans on existing lines.

Crapo HTL-135 makes practicable spans of 350 feet in heavy loading, 450 feet in medium loading and 500 feet in light loading areas.

Before you construct new rural lines or rebuild old ones, be sure to get all the facts about these revolutionary wires! Complete technical and construction practice information, available in booklet form. Write for Bulletins No. 201 and No. 202!

INDIANA STEEL & WIRE CO.,
MUNCIE, - - INDIANA

Manufacturers of

Crapo Galvanized Steel Strand, Telephone and Telegraph Wire, Construction Wire and Tie Wire.

Index to Advertisements

A

Acme Visible Records, Inc..... —
Acorn Insulated Wire Co..... 12
American Coach & Body..... —
American Electrical Heater Co.... —
American Steel & Wire Co..... 15
American Tel. & Tel. Co.....10-11
Anthony Atwell & Associates.....
Automatic Electric Co...26-27-35-38-46
Automatic Tel. & Elec. Co., Ltd..... —

B

Banks Mfg. Company..... 38
Barnard Co., B. S..... —
Bartlett Mfg. Co..... —
Berry, L. M..... 48
Brach, L. S. Mfg. Co..... 42
Buckeye Telephone Supply Co..... 49

C

Calculagraph Co..... 14
Carney & Company..... 48
Chance Co., A. B..... 41
Channel Splicing Machine..... —
Chisholm-Ryder Co., Inc..... —
Churchill Cabinet Co..... —
Coffing Hoist Co..... —
Columbia Steel Co..... 15
Commercial Cord & Supply Co..... —
Communication Equipment & Engineering Co. ..... —
Cook Electric Co.....7-44
Copperweld Steel Co..... 2

D

Davey Tree Expert Co..... —
Dillon, W. C. & Company..... 51
Dorson Corporation ..... —

E

Electric Storage Battery Co., The.. 6
Eveready Dry Cells..... 16

F

Fansteel Metallurgical Corp'n..... —
Forged Steel Products Co..... 42

G

Gardiner Metal Co..... —
General Cable Co..... 25
General Electric ..... —
Graybar Electric Co..... 15
Gray Manufacturing Co.....

H

Holtzer Cabot Electric Co..... 47
Hubbard & Co..... —
Hotel Mark Twain..... —

I

Indiana Steel & Wire Co..... 50

J

Jackson Lumber Co..... —

K

Kearney Corp., Jas. R..... 39
Kellogg Switchboard & Supply Co. 5
King, W. T..... 48

L

Leich Sales Corp..... 3
Lenz Electric Mfg. Co..... —
Lincoln Hotel 12
Line Material Co..... 45
Loomis Advertising Co..... 48
Lorain Products Corp..... 12

N

National Carbon Co..... 16
National Telephone Supply Co..... 51
North Electric Electric Mfg. Co.... 52

O

Oliver Iron & Steel Corp..... —
Owens-Illinois Glass Co..... 47

P

Paine Company, The..... 8
Pearl, Wm. H..... —
Peatrophone Corp..... —
Phillips Electric Works, Ltd..... 8
H. K. Porter, Inc..... —
Premax Products..... —
Putnam & Company..... —

R

Raytheon Mfg. Co.....34-35
Rebuilt Electric Equipment..... 49
Reliable Electric Co..... 37
John A. Roebling's Son.....40

S

Seymour Smith & Son..... 43
Schauer Machine Co..... 48
Sellers, Maurice..... —
Shallcross Mfg. Co..... —
Sherron Metallic Co..... —
Siemens Bros. & Co., Ltd..... —
Speedometer Elec. Co..... —
Stromberg-Carlson Tel. Mfg. Co..... 9-31
Suttle Equipment Co..... 42

T

Telkor, Inc..... 8
Telephone Repair Co..... 49
Telephone Engineer..... 4

U

Unique Mfg. Co..... 46
Union Carbide & Carbon Co..... 16
U. S. Steel Corp..... 15
U. S. Independent Tel. Assn..... —

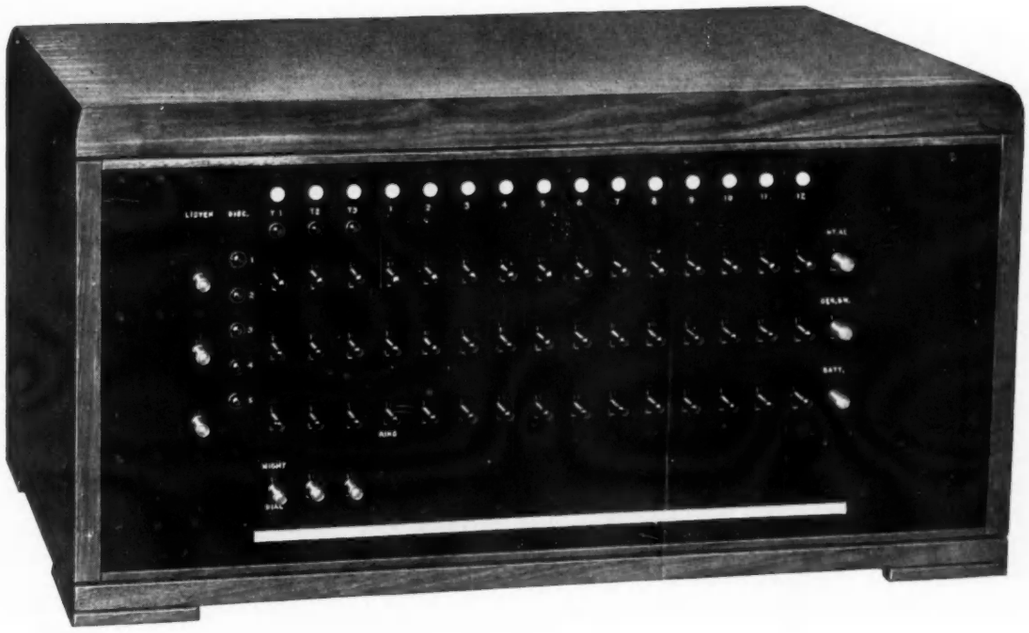
V

Valentine & Clark Corp..... 48

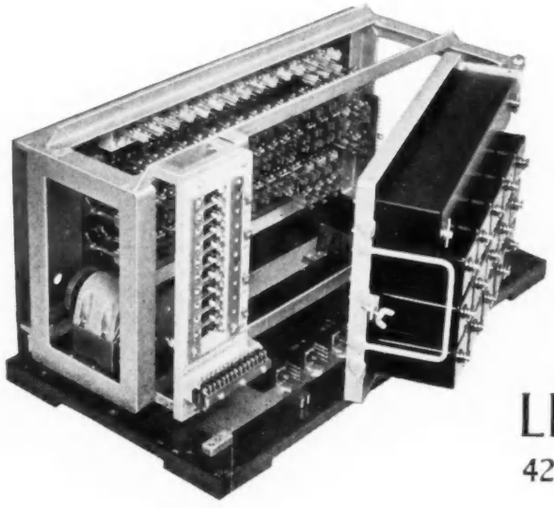
W

Western Electric Co..... 33
Williams, Geo. E..... 48
Wopat, J. W..... 48
Wray, J. G. & Co..... 48

LEICH CORDLESS P-B-X



Modern, simple, sturdy, attractive — the Leich No. 5-B-12 Cordless exemplifies the careful design and fine workmanship inherent in all Leich-Built switchboards. Beneath the streamlined cabinet is a rigid chassis of welded steel — having virtually skyscraper strength. On the reverse side of the polished faceplates are the rugged working parts which have been proved in years of operation and which are constructed to withstand abuse as well as use. Back of the Leich nameplate is thirty-three years of telephone manufacturing experience and an enviable reputation for excellent craftsmanship — a reputation which more telephone companies are coming to appreciate with each year.



Leich Cordless Switchboards are arranged for operation with either manual or automatic central office equipment. They are available in three sizes, ranging in capacity from 12 lines, 3 trunks and 5 links to 20 lines, 5 trunks and 7 links. Figures covering specific units will be furnished without obligation. Write to:

LEICH SALES CORPORATION

427 W. RANDOLPH STREET., CHICAGO, ILLINOIS

Flash

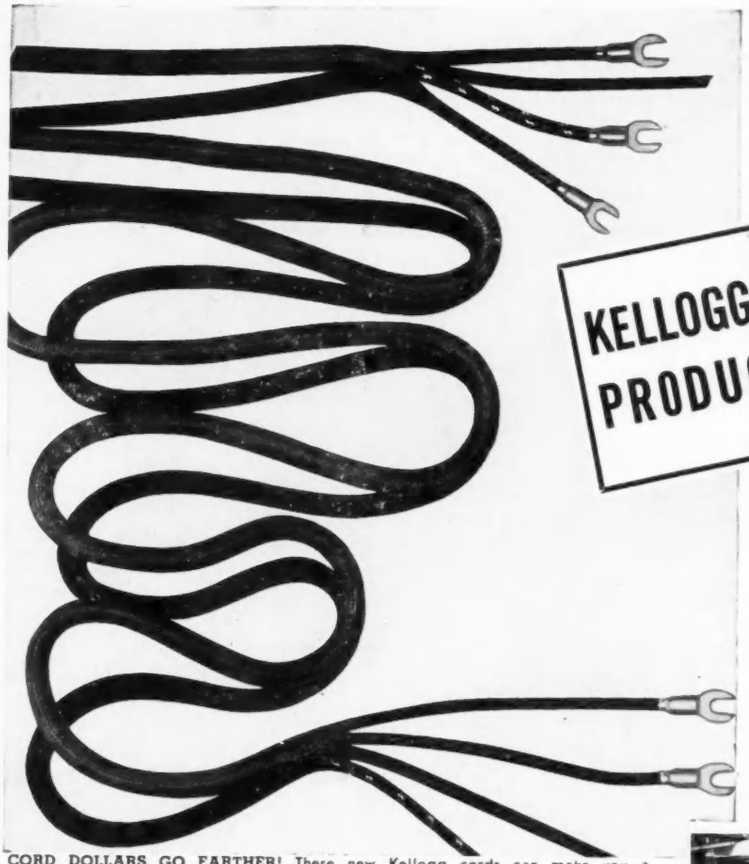
FINAL DEADLINE ON Advertising Copy for the January-1941

TELEPHONE "BLUE BOOK"

EXTENDED TO

JANUARY 6

THE Telephone "BLUE BOOK", published as a part of the January 15 issue of TELEPHONE ENGINEER, and including the classified BUYER'S GUIDE, offers manufacturers and Suppliers of the telephone industry their "best bet" to reach EVERY BUYER of telephone equipment—EVERY MONTH throughout 1941. Your selling job for the coming twelve months will not be complete without display space in this "handyman" and BUYER'S GUIDE. *No advance in advertising rates.* For additional information —write TELEPHONE ENGINEER, 7720 Sheridan Road, Chicago, Illinois.



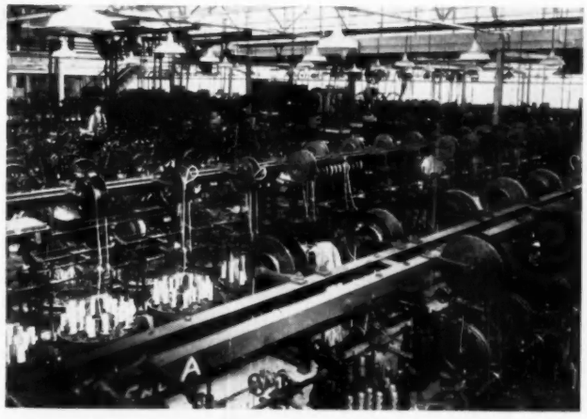
KELLOGG'S CONSTANT RESEARCH PRODUCES BETTER CORDS!

THROUGH Kellogg's development facilities and research, new materials have been found which increase cord life 25% to 35%. To you this means less maintenance, more economical operation and better service to subscribers. A new, complete CORD GUIDE is available, free, on request.

CORD DOLLARS GO FARTHER! These new Kellogg cords can make you a saving of from 1/4 to 1/3 on replacements and substantially cut down purchases. Kellogg prices are the lowest in years! Now there's practically no difference in price between these better cords and those of cheaper make. For Kellogg's production methods, speedy machines, experienced workers, tremendous purchasing power of raw materials and volume sales assure the most economical manufacture.

FROM SKEINS TO SPOOLS! Here the silk and cotton are put on spools for the automatic machines. Hundreds of these spools, containing miles of thread, are needed to keep this great Cord department supplied.

1200 TO 2000 FEET EVERY 8 HOURS! These are the speedy 16-spindle braiders which handle the conductors for Kellogg cords, jumper wire, etc. Each machine can produce over 1/3 of a mile of braided conductors daily.



EXPERIENCE COUNTS! Vast floor space in the great new Kellogg factory is devoted to the manufacture of telephone and switchboard cords. Here is where machines, materials and experts collaborate in the production of these cords which have long been recognized as the finest in the industry. The average experience of Kellogg cord department operators covers more than 10 years each.

90 MILES A DAY! This is the kind of speed at which these machines insulate wire and tinsel. Each machine of this group applies up to 3 coverings of silk or cotton to 6 different conductors AT THE SAME TIME! Only purified silk and long-fibre cotton of the highest grade are used in the manufacture of Kellogg Cords!

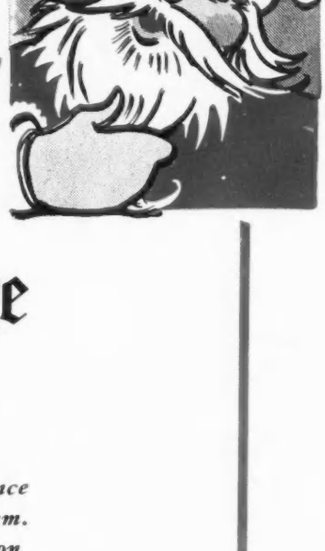
KELLOGG

KELLOGG

Switchboard & Supply Co.

6650 South Cicero Ave., Chicago

QUICKER THAN THE EYE! Conductors come out of these braiding machines as finished cords at the rate of 3000 per day for each machine.



Our Christmas Message

More than nineteen hundred years have passed since the wise men, guided by a vivid star, rode to Bethlehem. Yet down the corridor of time, generation after generation, by act, by song, by symbol, has kept alive the beauty and spirit of Christmas.

How good it is that once a year, people truly put aside their self interests, drop their grievances and grudges, and open wide the door of their hearts that others may see them at their best.

What a wonderful thing it would be if all the world could hold captive this kindliness of Christmas.

Here at TELEPHONE ENGINEER *we are especially grateful for the fellowship and friendliness that has been ours through happy and unhappy moments. But at Christmas time in America, we cannot but hope that the same spirit was more prevalent in other sections of the world.*

Amid the holly, the tinsel and the ornaments, may you discover for yourself and for those close to you, the deepest satisfactions of the Season.

The Staff
of
TELEPHONE ENGINEER

The Stromberg-Carlson No. 1212
Self-contained Handset

The Stromberg-Carlson No. 1211
Handset Wall Telephone

In selecting handsets for subscriber use, it is not only important that the instruments should blend into the scheme of home and office furnishings, but also important that they be so designed that they will not be outmoded for many years to come. The graceful design of both the Stromberg-Carlson No. 1212 Handset Telephone and the No. 1211 Handset Wall Telephone proves that these two instruments fulfill both requirements. Their graceful lines mean that they will not only be pleasing to the eye today, but also for many years to come.

But looks alone are not the chief appeal of these two handsets. From a standpoint of both transmission and reception, they are unsurpassed, due to the patented Stromberg-Carlson Transmitter and Receiver which permit a clarity of articulation that was previously impossible.

Order test samples of these two handsets. Test them under your own requirements, and you will see immediately why they are revenue builders.

STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY
Factory and General Offices: 100 Carlson Road, Rochester, N. Y., U. S. A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto

Stromberg-Carlson

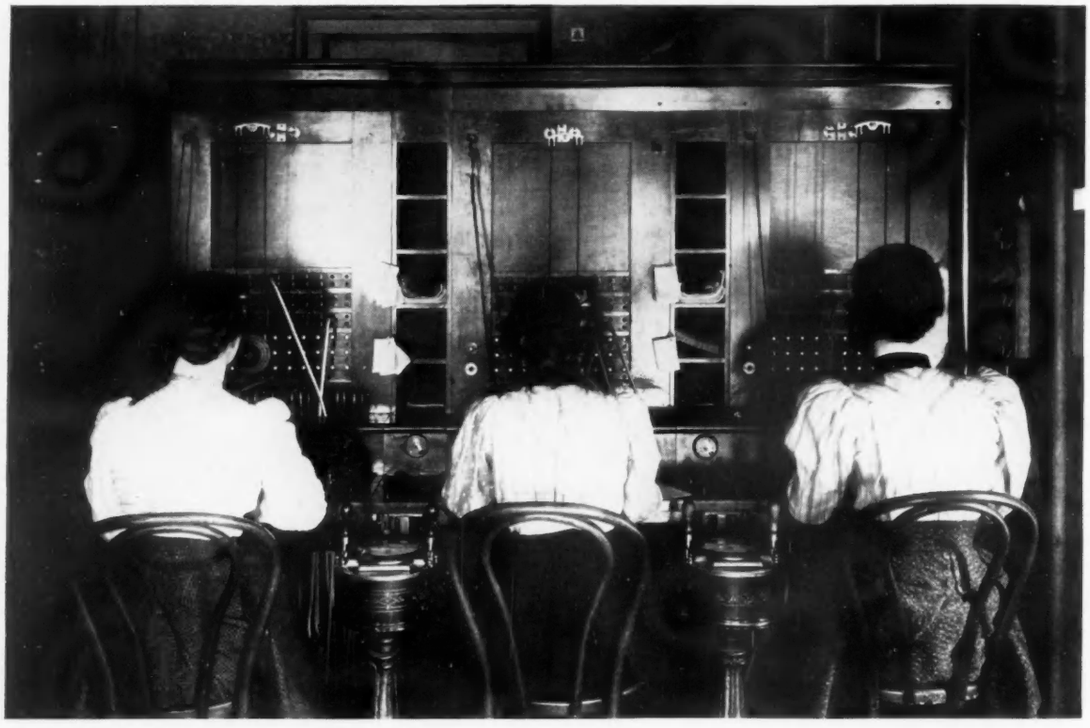
MAKERS OF VOICE TRANSMISSION AND VOICE RECEPTION APPARATUS FOR FORTY-FIVE YEARS

The advertisement on the opposite page is appearing in national magazines at Christmas time. The little telephone Santa Claus speaks the greetings of the industry to telephone users. And now, may we add our best wishes to all the men and women who make the telephone the friendly, useful instrument it is.

"Best Wishes for Your Happiness"

from your friends and neighbors in the telephone company. May the friendly spirit of the holidays carry through all of 1941. . . . BELL TELEPHONE SYSTEM

AN ADVERTISEMENT OF THE BELL TELEPHONE SYSTEM



June, 1898

Toll board of the New York & Penn. Telephone Co. at Elmira, N. Y.

Leg O' Mutton Sleeves and Chokers

Here is a busy morning at the toll board of the New York and Penn. Telephone Co., Elmira, N. Y.—in 1898.

Calculagraphs for mechanical toll timing were just getting their start in those days. Leg o' mutton sleeves and Calculagraphs are streamlined to handle the greatly increased volume of business.

The Model 33 Calculagraph is now a mere 7½" by 3⅜" and fits right into the key shelf. But it still plays a mighty important part in giving accurate mechanical, to-the-second timing of toll messages.

Model 33

SPECIFICATIONS: MODEL 33

COMPACT—7½"x3⅜". Takes up minimum space on switchboard.

WEIGHT—8 pounds.

UNOBSTRUCTED VIEW—Full vision of dial from any position on the switchboard.

SWEEP SECOND HAND—Tells the end of the initial period at a glance.

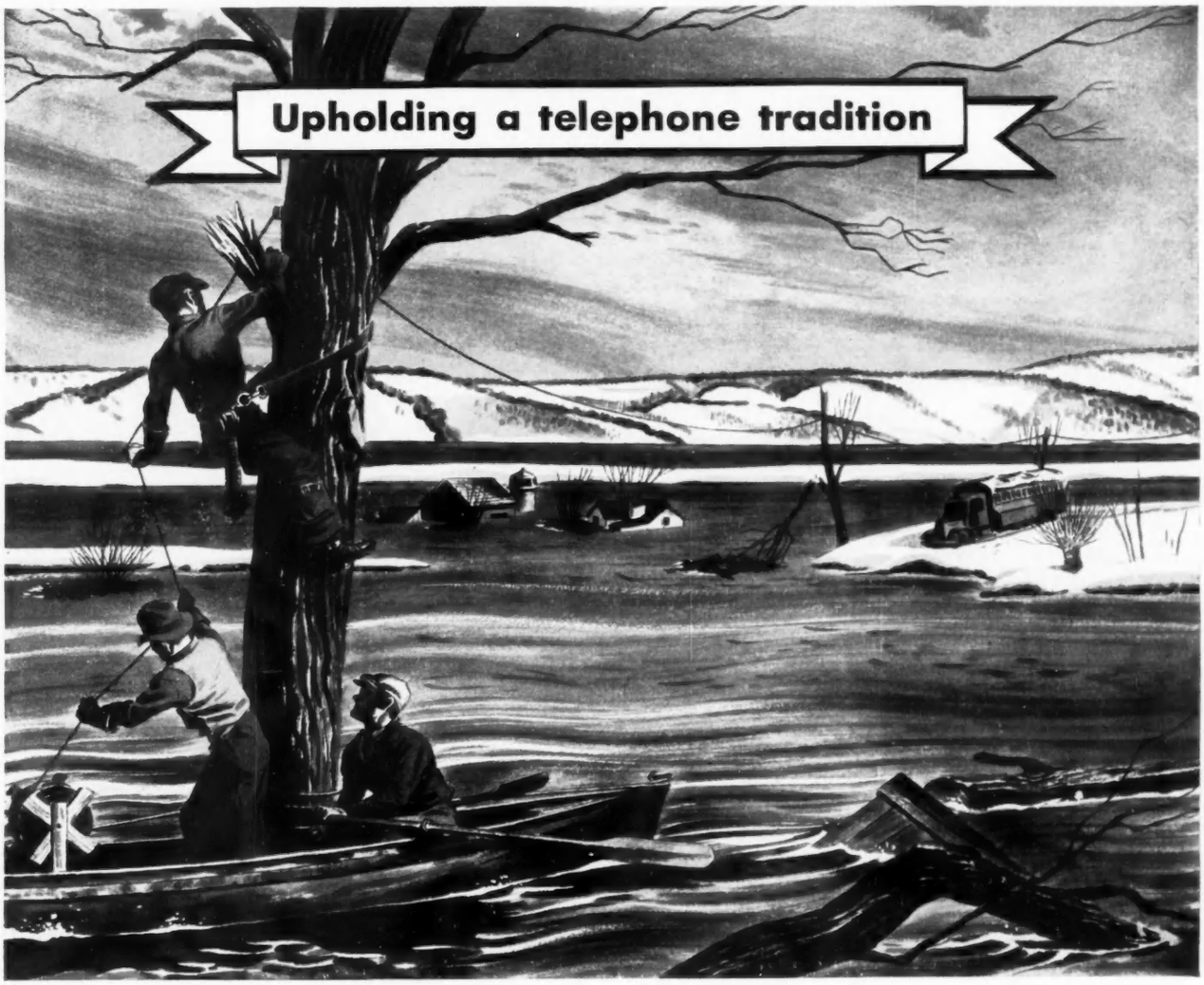
CALCULAGRAPH COMPANY

Main Office and Plant:

308 SUSSEX STREET HARRISON, N. J.

CALCULAGRAPH

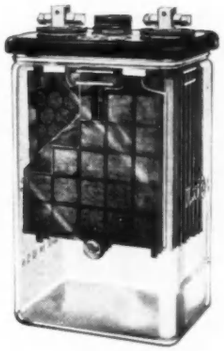
Accurate Toll Timing to the Second!



A special line for the sheriff... installed with the help of rowboats

WHEN a flood-swept valley had its means of communication disrupted, the first essential was to run telephone lines that would enable the sheriff to direct the work of rescue throughout the county. This was so quickly accomplished that all confusion and disorder were prevented . . . despite the fact that much of the linesmen's work had to be done by rowboat!

Persistence and resourcefulness in the face of obstacles are second nature to telephone employees. And one of the reasons is their complete confidence in the equipment on which they must rely.



Exide
TELEPHONE BATTERIES

Exide Batteries are part of this equipment, with a forty-five year record of dependability in telephone service. In time of emergency, their tremendous reserve power is always ready. In normal routine, they help to maintain the highest standards of quick, clear service.

No matter what the service—common battery, emergency reserve, signal or P.B.X., in small or large exchanges—you will find that Exides always live up to the highest telephone standards.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto